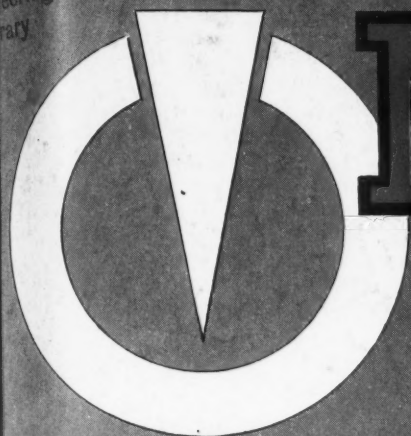


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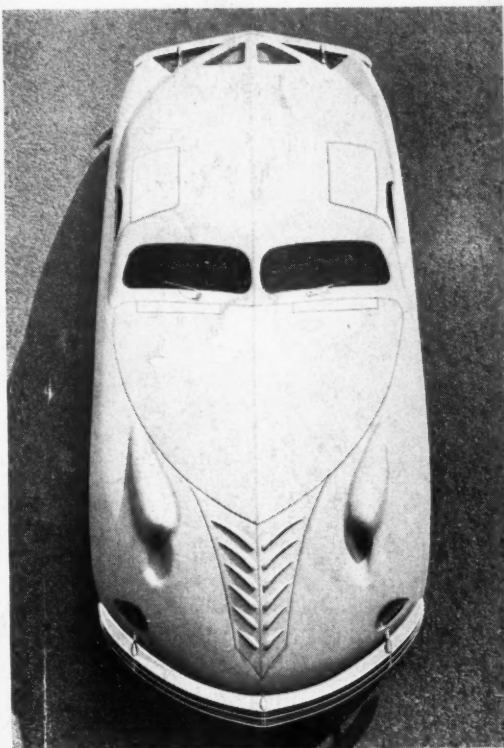
MOTOR AGE

CHILTON PUBLICATION

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

MARCH
1938

IN THIS ISSUE



Phantom Corsair
(See News Section)

Performance Requires Perfect Timing

Selling your customers on high octane gas, and keeping them sold, depends on performance. Here's how to get that performance.

Merrily We Roll Along

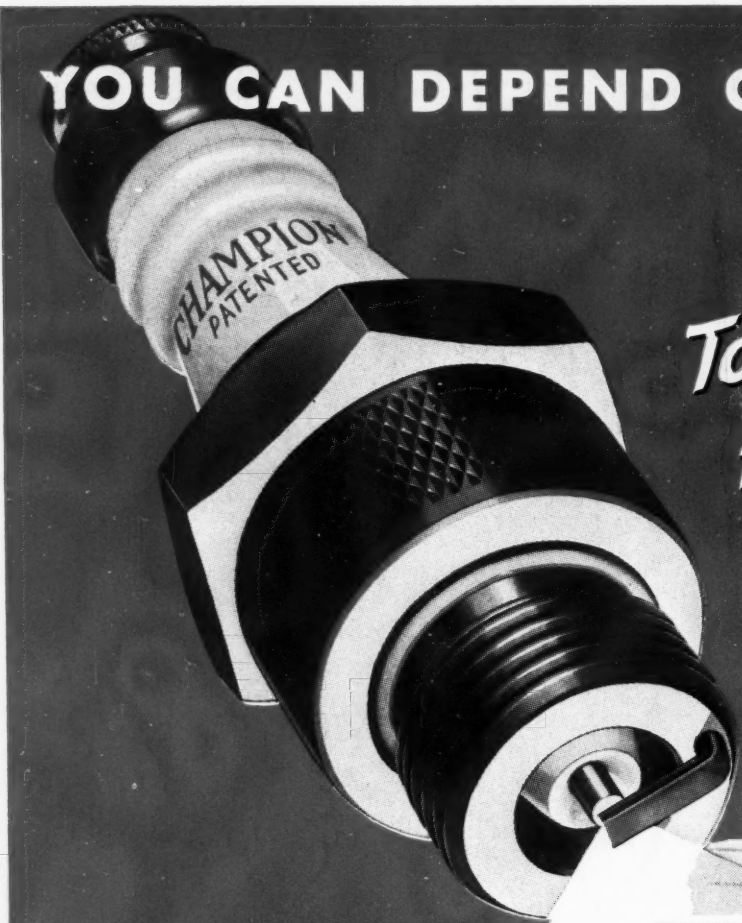
An article with lots of "meat", filled with the what's and how's for shock absorber service.

Lathe Work for the Mechanic

You'll want to keep this article on hand when truing and undercutting generator, horn and starter commutators.

YOU CAN DEPEND ON CHAMPIONS

*To Bring Business
to Your Door!*



The Sign of Dependable Service

Ever mindful of its obligations to the dealer, the Champion Spark Plug Company has always pursued the policy of providing everything possible to help bring business to his door.

The superiority of Champion Spark Plugs has been consistently supported by the greatest volume of national advertising ever put back of any spark plug. National advertising is actually the strongest and most highly selective local advertising and becomes the dealer's

advertising when he properly identifies himself as a Champion dealer.

To strengthen this tie between dealer and customer, Champion national advertising will periodically display the famous "bow-tie" sign, and a typical dealer as shown above, with the significant and confidence-building line "The Sign of Dependable Service."

Be sure that you have your share of point-of-sale and dealer help material, so that

you are properly identified with this sales building program. Champion offers you a wide variety, from which you can select items best suited to your individual requirements.



CHECK AND CLEAN SPARK PLUGS WHEN YOU CHANGE OIL



YOU CAN WRITE YOUR OWN TICKET FOR PART SALES *and* SERVICE *in* 1938 *with*

NIEHOFF PORTABLE

**KEEP YOUR SHOP
OUT IN FRONT *with*
NIEHOFF PARTS
and
TESTING EQUIPMENT**

T-5 TIMING LIGHT

An invaluable service instrument for quick and accurate checking of ignition timing and synchronization. Every light is accurately focused to give maximum concentrated illumination. Compactly designed to easily slip between fan assembly and engine or other close quarters. Durable shock-proof case. Priced within reach of every repair shop.

No. T-5 Dealer's Price.....

\$3.95

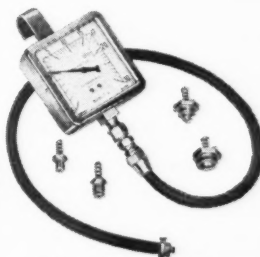


T-8 COMPRESSOMETER

A one-man unit. Fast, Easy, Accurate. Embodying latest scientific modern design. Accurately shows worn piston rings and cylinder walls, leaky valves and gaskets. Determines exact location of leak in cylinder. Large gauge calibrated to 200 lbs. Heavy Chrome Plated. Packed in metal container.

Dealer's Price

\$9.50



T-9 VACUOMETER

Detects: engine troubles, incorrect carburetor adjustments, vacuum tank and fuel pump failures, leaky or sticky valves—faulty springs; accurately and quickly. Tests muffler and exhaust back pressure. Operates from any vacuum connection. Heavy chrome plate. Packed in metal container.

Dealer's Price

\$8.50

INSTRUMENTS — that quickly pay for themselves and pay you by clinching sales and service with unbelievable ease. They save time, eliminate guesswork and enable mechanics to service several cars at the same time. Step into 1938 with these Niehoff precision instruments — lift your shop above competition — and increase your parts and labor sales. See your jobber TODAY. If he can't supply you write, wire or phone us direct.

"COILOMETER"

Booms sales on Coils, Condensers, Points, Caps, Plugs and Rotors. Tests any coil swiftly and accurately, on or off car. Three speeds show coil performance under all conditions. Indicates dead short draw and in-put of coil at operating speeds. Geissler tube detects coil missing at high speed. Shows coil output in millimeters on large dial—and adjustable spark gap. Tests condensers—indicates incorrect plugs, leaky ignition cables, cracked caps and rotor troubles. Operates from car battery.

No. T-12

Dealer's Price **\$45.00**

"CONDENSOMETER"

Accurately reveals condenser value. Shows capacity and leakage, indicates weak or faulty insulation. Tests capacity at 270 volts building to 400 volts A. C. Leakage tested at 400 volts D.C. Makes power factor test—measures resistance of condensers to oscillating current, same as produced by ignition coils in actual operation. Automatically discharges condensers at end of test.

No. T-11

Dealer's Price **\$39.00**

"GENEROMETER"

Simplifies all generator, voltage regulator and relay adjustments. Accurately checks charging rates, field currents, load readings, high resistance connections. Indicates lamp, radio and other accessory load readings. Operates from car equipment without use of outside current. So simple that any mechanic can use it successfully—saves time, creates customer satisfaction and induces him to suggest parts purchases.

No. T-10

Dealer's Price **\$42.00**

NIEHOFF *Precision* INSTRUMENTS



ORDER YOURS TODAY

... make your service complete with these 3 portable instruments and attractive all-steel merchandising display stand 60" high by 14½" by 18" that outmodes heavy cumbersome equipment. Stand equipped with clips for coil and condenser —large battery shelf and place for models T-5, T-8 and T-9. Liberal time payment plan through Commercial Credit Company enables you to pay out of profits.

Nos. T-10-11 and 12 with
Stand complete Dealer's Price.... **\$136.00**

Genuine
NIEHOFF
PRODUCTS

C. E. NIEHOFF & CO.

232 W. SUPERIOR ST. CHICAGO, ILLINOIS

★ENGINEERED FOR ACCURATE PERFORMANCE AND DEPENDABILITY★

MAKE THE
5-O'CLOCK
TEST



- Because you're familiar with typewriter noise—you think nothing happens when you hear it seven hours a day. You could get used to seven hours a day of radio static, too—if you had to.
- But think back on the times when you've been *most* weary. Aren't they the times when that noise in your office has been most persistent?
- Make the 5 o'clock test. It's free. Put a Remington Noiseless typewriter in your office for one full day. You'll realize, then, that typewriter efficiency includes noiselessness—that nerve-wracking typewriter noise tires you *more* than office work.

Remington Rand Inc.
BUFFALO, N. Y.

World's Largest Manufacturers of
Noiseless and Portable Typewriters



More Remingtons built and sold
in 1937 than any other make.

MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT
REPAIR SHOP

*Subscriptions for Motor Age are accepted only from
independent repair shops and their employees.*

Vol. LVII, No. 4

March, 1938

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MOTOR AGE

MARCH 1938

SHOP TALK

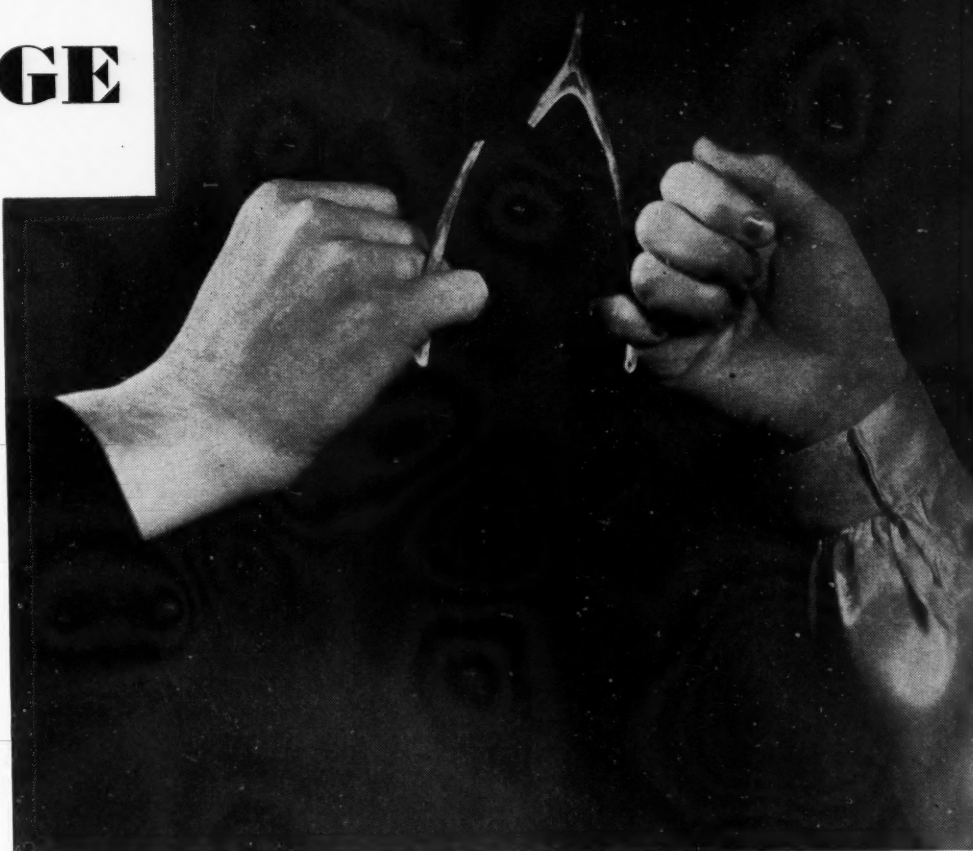
Wishing

All the readers who have been wishing for more detailed tune-up dope on the 1938 cars are about to have their wish come true, for the April issue will have the most complete information printed on the new jobs. Old subscribers are familiar with the April service and tune-up issue, many of them keep them on file as they have found the value of having accurate reference material at hand at all times. This year's edition will have all the features that have made previous issues so valuable. In addition there are special articles showing how shops—readers of MOTOR AGE—have increased their profits by paying special attention to hand tools, equipment, parts and accessories. Take a tip and apply their methods to your own business.

Success

While in New York the other day I stopped in to see Lee Hanford who is responsible for the swell job that United Motors Service has done in that city. After talking to Lee for only a few minutes it was easy to understand why his branch showed a profit during the entire depression. One thing Lee could not understand is why independent repair shops don't take full advantage of all the direct mail material that is offered to them by various manufacturers. With some of the manufacturers, all that is necessary is to send them a check to cover the cost of mailing, and they will address and mail the material to the car owners in the vicinity of the service station.

MOTOR AGE, March, 1938



Poet

I knew Scotty for over five years before I discovered that his name was Ellis Stoller. He operates the Cobb's Creek Garage in Philadelphia and does he keep after his customers! He just got out a new blotter which he is sending to his customers. For an illustration he is using a cartoon which appeared in a recent issue of MOTOR AGE and to which he gives due credit. Scotty also goes in for poetry, at the bottom of the cartoon (which appeared in the January issue and originally had the caption "It has Halitosis") Scotty had this original poem:

If your car has halitosis
It ails and needs some diagnosis
Bring it here, we NEVER lie,
George Washington, Ellis Stoller, I.

I've read better poetry, but I am quite sure that any one receiving one of Scotty's blotters will be sure to think of him the next time some repairs are needed.

Boss

The boss of Mundell Motor Co., Whittington, Ill.—who is none other than J. W. Mundell, says that he wishes MOTOR AGE was a weekly,

and that he has every issue from 1915 to 1929, and most emphatically they are not for sale. Well, that is great news, but personally I am just as well satisfied that MOTOR AGE comes out only once a month. That's plenty of work for me.

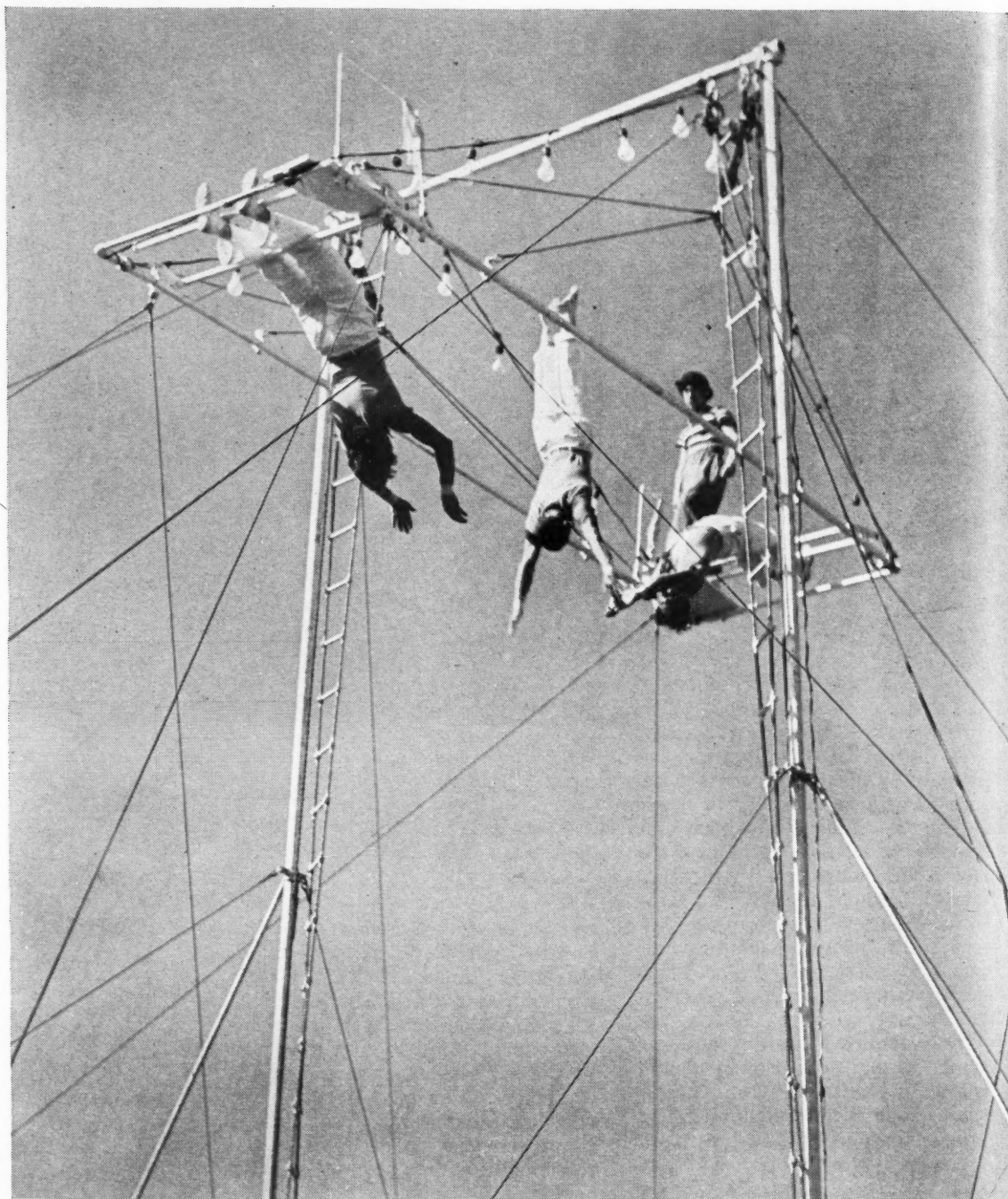
President

Just received a letter from Fred Warrick who, in addition to operating the Congress Garage in Kansas City, is President of the Automotive Trades Association of K.C. To give you an idea of the size of Fred's place, he employs 23 men. I'll bet the car dealers in K.C. know he is in business.

Hunting

B. O. Yeck, who owns and operates the Elkhorn Garage in Daniel, Wyo., is another subscriber who started reading MOTOR AGE in 1915. That must be a great country to go hunting, as Yeck enclosed a photograph of a herd of bull elk. If I ever get out that way I'll be sure to take a rifle along.

Bill Toboear



Performance Requires Perfect

Don't be a tuner downer - Time the ignition to get the most out of the

TO get the most out of today's high compression engines it is necessary to use fuel having an octane rating of 80 or better. But just filling a customer's car with that kind of fuel won't give the customer any material improve-

ment in performance. Of course it will remove the knock, but to get the most out of the engine and the premium gasoline, the engine has to be specially tuned.

Many mechanics set the spark so that the engine will not knock

when "regular" gasoline is used. When that is done, the customer will not notice any marked improvement in performance or economy when Ethyl or other high anti-knock fuels are used. The result is that the service station will

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By
BILL TOBOLDT

have greater difficulty in persuading the customer that extra price fuel is worthwhile.

However, if the engine is properly tuned for high anti-knock fuel and the customer is sold on the economy and performance resulting from the use of such fuel, the shop will have more satisfied customers and enjoy the increased gasoline profits.

So, the thing to do is to sell the customer on the increased performance and economy resulting from the sale of high octane gas and then tune the engine with that fuel in the tank.

Tuning the engine for this gas isn't any different than if any other fuel is used except—and that is a big exception—the spark timing. Using factory markings or specifications are only approximations. Road testing is very little better because of traffic congestions and variations in wind velocity.

The Ethyl Corporation in their clinics, which are covering the country, use chassis dynamometers to set the spark at the point

of maximum power. Unfortunately there are few service stations with such elaborate equipment. However, it is possible to set the spark accurately and at the point that will produce maximum power without the use of equipment. The method is far superior to road testing and by actual comparison proved equal to settings obtained on a dynamometer. However, dynamometers are also useful as a selling tool and are used for checking the results of other repairs, replacements and adjustments.

To time the ignition so as to obtain maximum power from the fuel, disconnect the leads to half the spark plugs, jack up the rear wheels and place the transmission in direct drive. Then, with the engine running, set the throttle so that the wheels are turning over at a speed of 30 m.p.h. Then adjust spark timing to obtain maximum speed as indicated by speedometer.

The ignition timing was set by this method on several cars which were then checked on dynamom-

eters. In each case the timing checked within $\frac{1}{2}$ deg. Timing was also adjusted on these same cars by the familiar road testing method which, when checked on a dynamometer, was found to be from one to two degrees from the point producing maximum power.

In other words, setting the spark timing by means of the speedometer and with the rear wheels jacked up is far superior to the usual road testing method and about equal to the setting as found by a chassis dynamometer.

As a substitute, a vacuum gage can be used instead of the speedometer. The vacuum gage has the advantage that a single mechanic can do the job. However, tests proved that the spark setting was not quite as accurate as when the speedometer method was used.

To sell the use of Ethyl or high anti-knock fuels to the car-owning public, the repairman must do more than simply say that this kind of gas is better. He must have facts and figures to show how much more power will be
(Continued on page 56)

Timing

fuel and engine



Merrily We Roll Along

And the shock absorber gets the credit. Here are complete servicing instructions covering those new Delco direct double-acting units

WHEN the road is smooth we never give a thought for the parts between us and the road that make such a comfortable ride possible. But when we hit a bump, and Mamma leaves the rear seat and cracks her head against the top of the car, it's time to give a thought to the shock absorbers.

The coil spring suspension employed on the rear of the 1938 Buick has excited considerable interest among mechanics. The shock absorbers used on this job are the Delco direct double-acting type. All Series use the same shock absorber, the only difference being in the calibration of the compression and rebound valves.

The first step in checking for an undesirable riding condition is to disconnect the shock absorbers at the axle end, and drive the car, to definitely determine if the trouble is in the shock absorbers. If it is,

the next step is to check to see if there is sufficient oil in the unit. This is done by taking hold of the lower eye and moving the absorber several times through its full stroke. It should require a hard push and pull all the way, with no "back lash" at the beginning of either stroke. If there is back-lash, it indicates that the oil is low and the unit should be refilled. This requires removing the shock absorber from the car.

The upper end of the unit pivots on a stud which is a part of a bracket bolted to the upper side of the frame side rail. Instead of removing the unit from the stud it is much easier to remove the bracket from the frame by taking out the two cap screws. They screw into a plate which is welded to the under side of the frame flange, so there are no nuts to worry with.

Clean all the dirt away from the

filler plug, and clamp the lower eye (filler plug end) in a vise with the filler plug down and the unit on an angle of 45 deg. which is approximately its normal angle when installed on the car. Pull the shock absorber out to its fully extended position and then remove the filler plug. Pump the unit back and forth until all the oil is pumped out. Then turn the unit over in the vise so that the filler hole is up, but be sure to keep it at the same angle. This eliminates the possibility of air pockets.

Collapse the unit to its shortest length. Screw the shock absorber filler cup into the filler hole, close the shut-off valve and fill the cup with 10 ounces (or 300 c.c.) of shock absorber fluid. *Do not use more than 10 ounces, as excess fluid will ruin the seal assembly.* Then open the shut-off valve, and pull the shock absorber out to its full

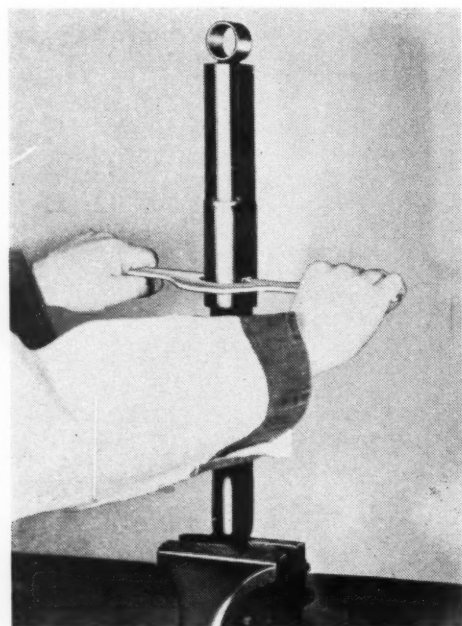


Fig. 1. Removing piston rod guide retaining nut with spanner wrench inserted through the dust shield.

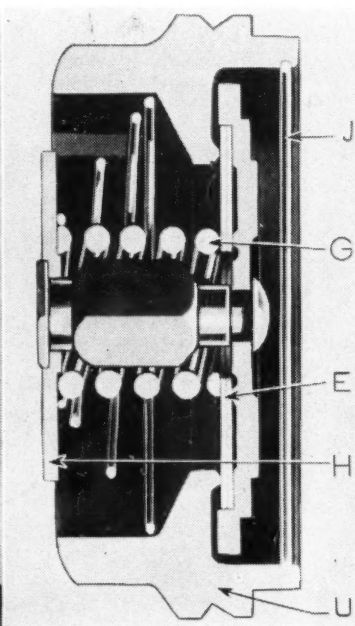


Fig. 2. The compression and intake valve, located in filler plug end, showing the order of assembly.

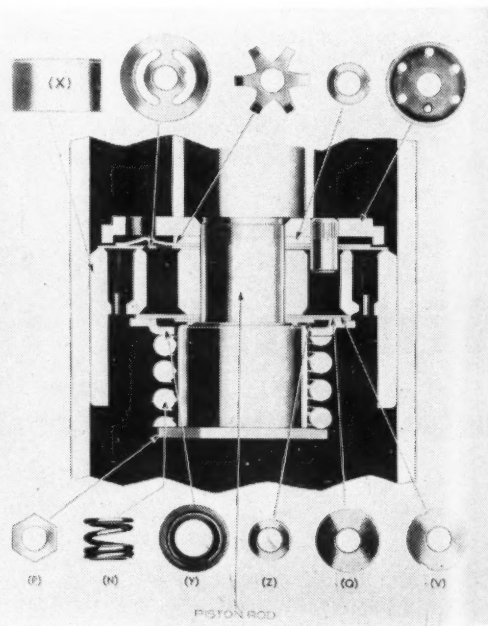


Fig. 3. Piston and rebound valve assembly, with reduced illustrations of parts, showing order of assembly.

by
BOB HANKINSON

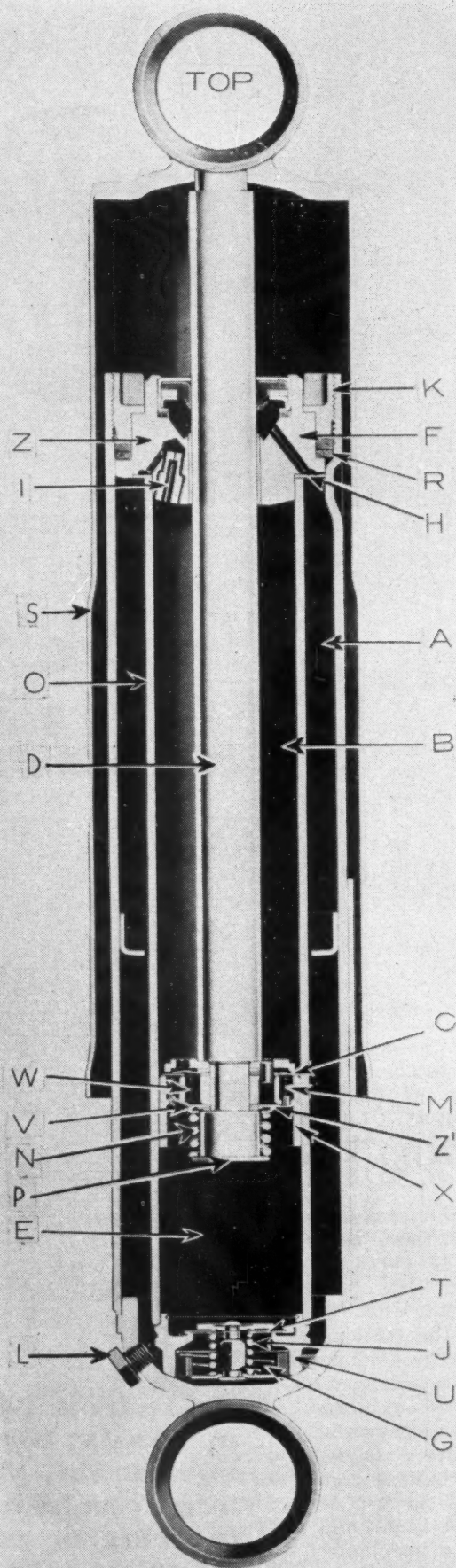


Fig. 4. Sectional view of the new Delco direct double-acting shock absorber used on the rear suspension of the 1938 Buick.

length, drawing the fluid into the unit. Work it back and forth with short quick strokes until all the fluid is drawn out of the filler cup. Then replace the filler plug and check the shock by working it back and forth through its full limit of travel to work out any air that may remain in the cylinder. Reinstall the unit on the car (Fig. 5).

It is possible to change the ride characteristics of the car by changing the valves in the shock absorber. This necessitates removing the shock from the car, pumping the fluid out, and then disassembling the unit. Place it in a vise, clamping the lower eye, and collapse it to its shortest length. In the outer dust shield (S, Fig. 4) there is a knock-out plug. Remove this plug. In some cases this plug may not be cut deep enough to permit knocking it out, and it may be necessary to cut it out with a hacksaw. Then extend the unit to its longest length and insert a spanner wrench through the hole so that the lugs of the wrench will engage with the slots in the top of the rod guide retailer nut (K, Fig. 4). Screw the nut out, and pull the outer dust shield out of the inner or lower half. The compression cylinder (O, Fig. 4) will come out with the dust
(Continued on page 57)

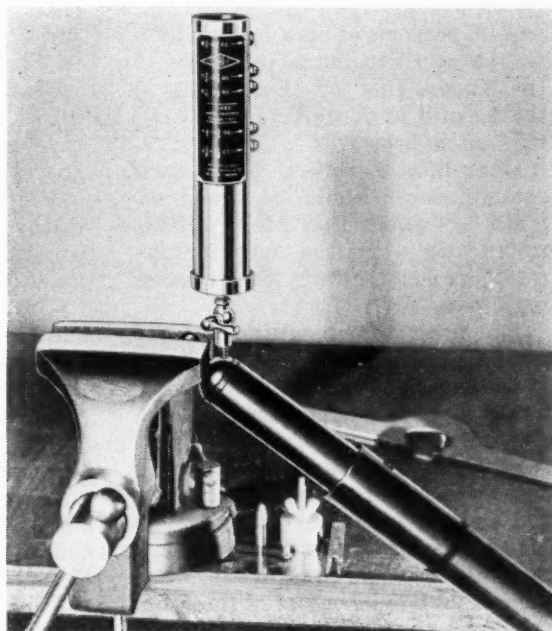
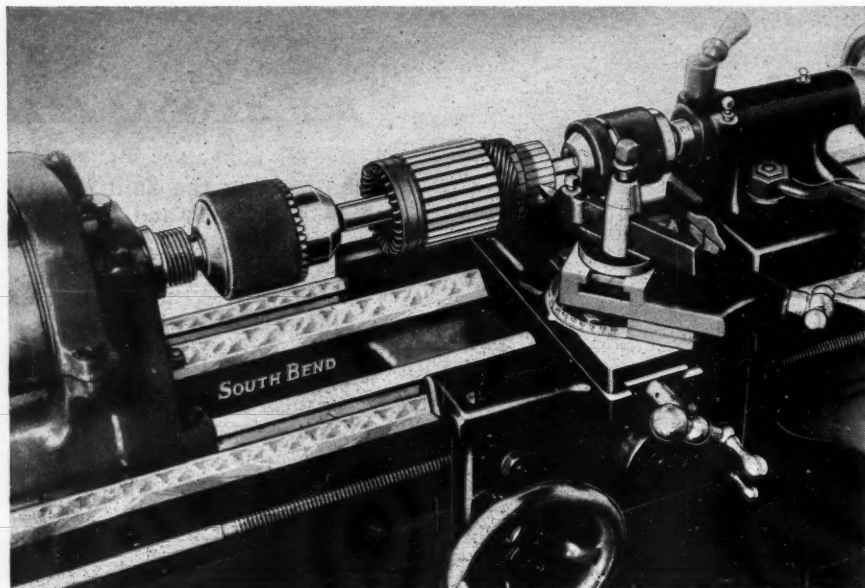


Fig. 5. Refilling with fluid, using a graduated filler cup. Note angle at which unit is clamped in vise.



Lathe Work for The Mechanic

THERE are innumerable jobs in an automotive repair shop that can be performed on a lathe which would result in increased profit to the shop. One of these jobs is truing and undercutting an armature commutator.

Generator, starter and horn commutators should be trued on a lathe when they are out-of-round and when the mica insulation projects above the copper segments.

The first step in truing a commutator is to place the armature in the lathe. If the armature shaft has center holes, the conventional lathe dog can be used. If the shaft is of the centerless type, it will be necessary to use a chuck at each end as shown in the illustrations. Lathe manufacturers state that the chuck method provides greater accuracy. It will be noted that the chuck at the left or live end of the armature is of the automatic type. A $\frac{3}{4}$ in. drill chuck is satisfactory. At the right or tail stock

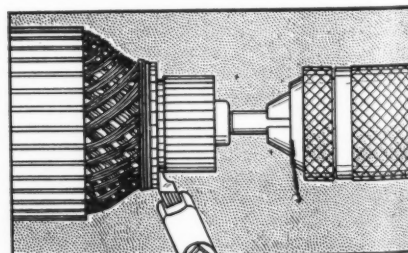
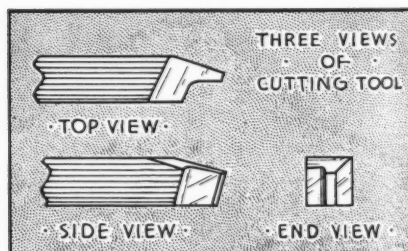
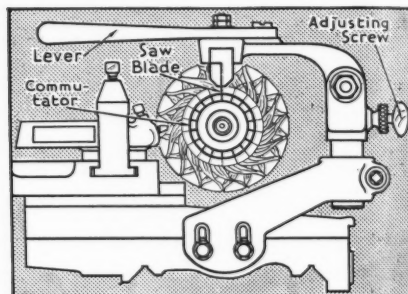
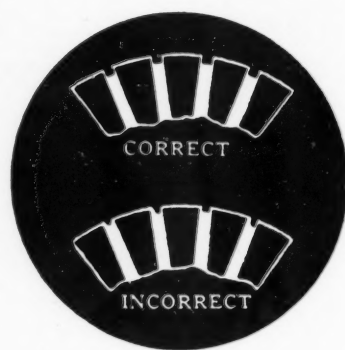
end of the armature shaft a special chuck having three brass jaws is used. The jaws are locked in position, tight enough to provide a good running fit. A few drops of oil are used on the armature shaft where it rides in the special chuck.

Having mounted the armature in the lathe, adjust the lathe belts to produce a spindle speed of about 300 to 400 r.p.m.

The type of cutting tool is shown in one of the illustrations. Be sure the cutting edge is sharp and that the top rake, side rake, cutting edge angle and tool clearance correspond to those shown in the illustration. This tool is designed especially for cutting copper commutators and the top of the cutter bit is perfectly flat and there is no side rake on back rake.

This will prevent the tool from chattering and digging in. After grinding and honing the cutter bit or tool, set it in the tool holder so

(Continued on page 54)



Aside from being a handy bit of equipment, your lathe can be used to bring in extra profit jobs.



Selling With Stamps

First in a series of articles on how, when and where to use Direct Mail for bringing in the Extra Profits

**BY
BERT POLLOCK**

EVER since it was first noticed that the postman never has the door slammed in his face business establishments of all sorts have been using him to deliver their sales talks. Direct mail has been found to be a very successful business getter. With a small investment in the preparation of cards or letters plus postage, many a repair shop has succeeded in securing a large amount of new business. However, many a large investment in direct mail has resulted in little or no increase in business. It's a fine way to increase

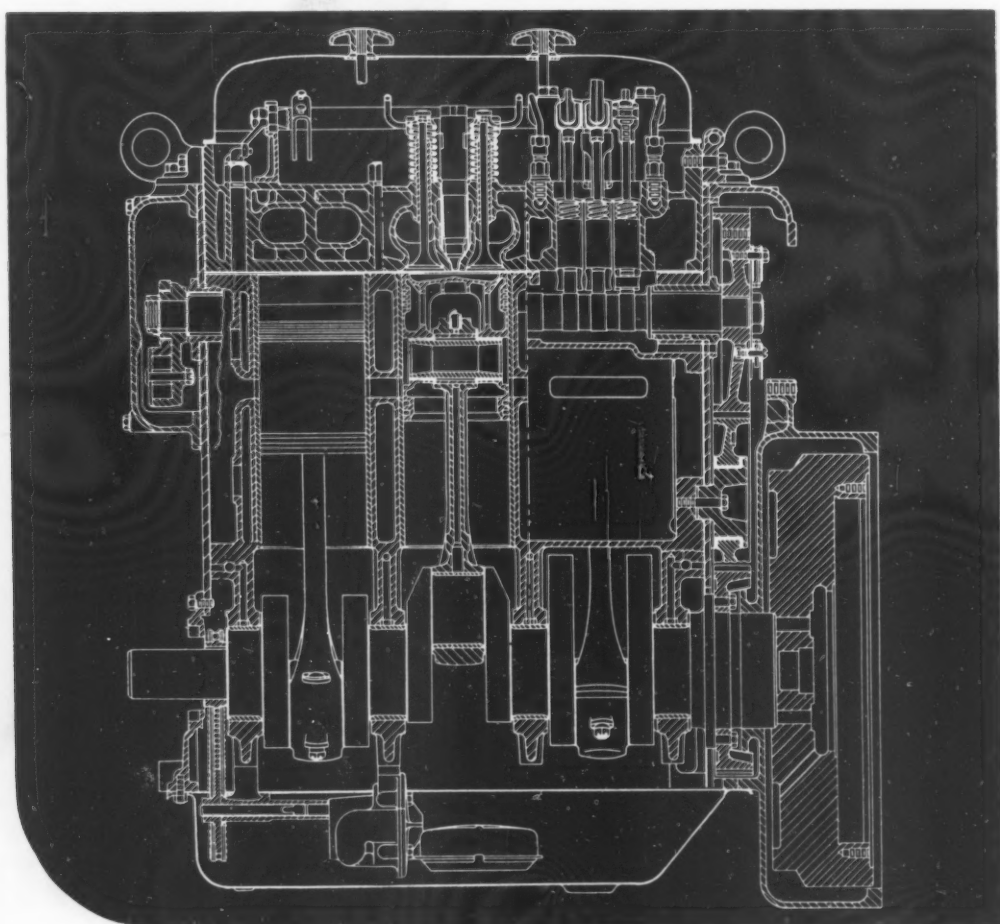
profits, it's also a fine way to throw money away with little or no results.

If you're thinking about using direct mail to swell your number of customers, do just that—think about it—before you spend your money in preparing and mailing a "sales talk" that will bring you no return.

Unless you are uncommonly lucky, or a super-genius in devising direct mail pieces of an unusually compelling nature, the mere fact that you send a letter or postal to a person telling him

(Continued on page 47)

GM's New Two-Cycle



GENERAL MOTORS' new automotive-type Diesel engine, which was announced to the public on Jan. 19, is a two-stroke uniflow engine which is being produced in one cylinder size ($4\frac{1}{4}$ by 5 in.) but in three, four, and six-cylinder types. It is known as the Series 71 and the various models are referred to as Model 3-71, Model 4-71 and Model 6-71. Maximum-power ratings of the three models are 80, 107, and 160 hp., respectively, at 1800 r.p.m., and continuous-power ratings, 45, 60, and 90 hp., respectively, at 1200 r.p.m. The maxi-

mum power rating is based on a b.m.e.p. of 82.7 lb. per sq. in. and the continuous power rating on a b.m.e.p. of 70 lb. per sq. in.

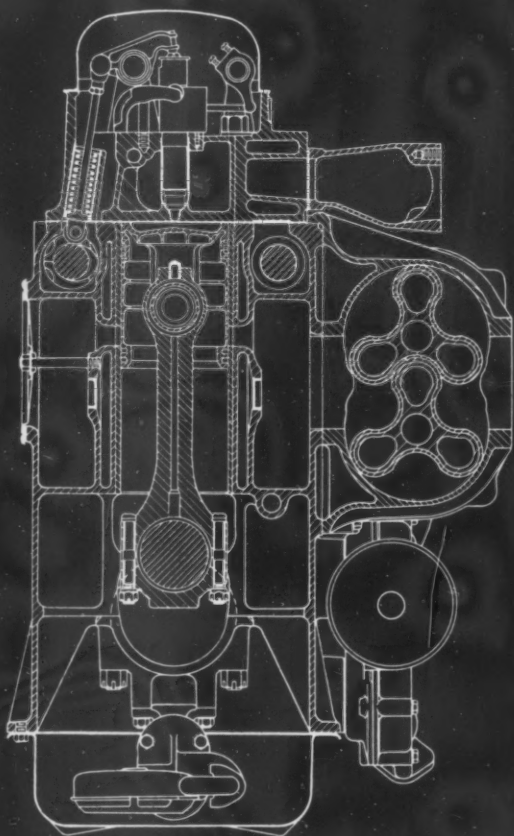
Weights of the three engines, including starting motor, governor, oil cooler, oil filter, and fuel filter, are 1160, 1330, and 1635 lb., respectively, which makes the specific weights 14.5 lb., 12.4 lb. and 10.2 lb. per hp. on the basis of the maximum rating, and 25.8 lb., 22.2 lb. and 18.1 lb. per hp. on the basis of the continuous rating. Necessary equipment not covered by the weight figures given includes a

generator, cooling fan, oil-bath air cleaner, air-intake elbow, and engine mountings.

These engines develop their maximum torque between 800 and 1000 r.p.m. This torque is 283 lb.-ft. for the three-cylinder, 375 lb.-ft. for the four-cylinder, and 562 lb.-ft. for the six-cylinder, or about 1.32 lb.-ft. per cu. in. displacement.

The reason for the choice of the two-stroke cycle for these engines is explained as follows in a statement by F. G. Shoemaker, chief engineer of the Detroit Diesel engine division of General Motors.

Diesels



"The greater fuel economy of the Diesel engine is due to its much higher compression ratio and explosion pressure. Obviously, these higher pressures require stronger cylinders, connecting rods, crankshafts, bearings, and so forth. Using the same materials and manufacturing methods as in commercial gasoline engines, and maintaining the same degree of reliability, this necessarily results in a larger and heavier engine, unless the Diesel engine principle permits making an engine of a fundamentally different type than a gasoline engine. For-

tunately, this is possible by making the Diesel engine two-cycle.

"The gasoline engine burns a mixture of gasoline vapor and air, which must be in proper proportion to ignite. This requires that the cylinder must be cleaned of burned gas through the exhaust valve by one stroke of the piston, and then the required amount of mixture drawn in through the intake valve by another stroke of the piston, thus preventing any of the fresh charge from mixing with the exhaust gases or being prematurely ignited if they are sufficiently

Capacities of GM's Model 71 Two-Stroke Diesel Engines

	Model 3-71	Model 4-71	Model 6-71
Lubricating Oil System, qts...	8½	10½	13½
Fuel Oil Tank, gallons.....	30	40	55
Cooling Water, gallons.....	11	12½	15½

hot. The Diesel engine, however, fills the cylinder with air only and does not spray the fuel into the air until the valves have closed and the air has been compressed up to the ignition point of the fuel. Hence, in a Diesel engine it is possible to have both the inlet and the exhaust open at the same time and to push out the burned gases with the incoming fresh air; even a little extra air may be added to make up for the slight mixing when the two come together. If the air is supplied by a blower under a low pressure, this scavenging and filling can be done while the piston is near the bottom end of the stroke, and the cylinder thus made to operate with only two piston strokes, or two-cycle.

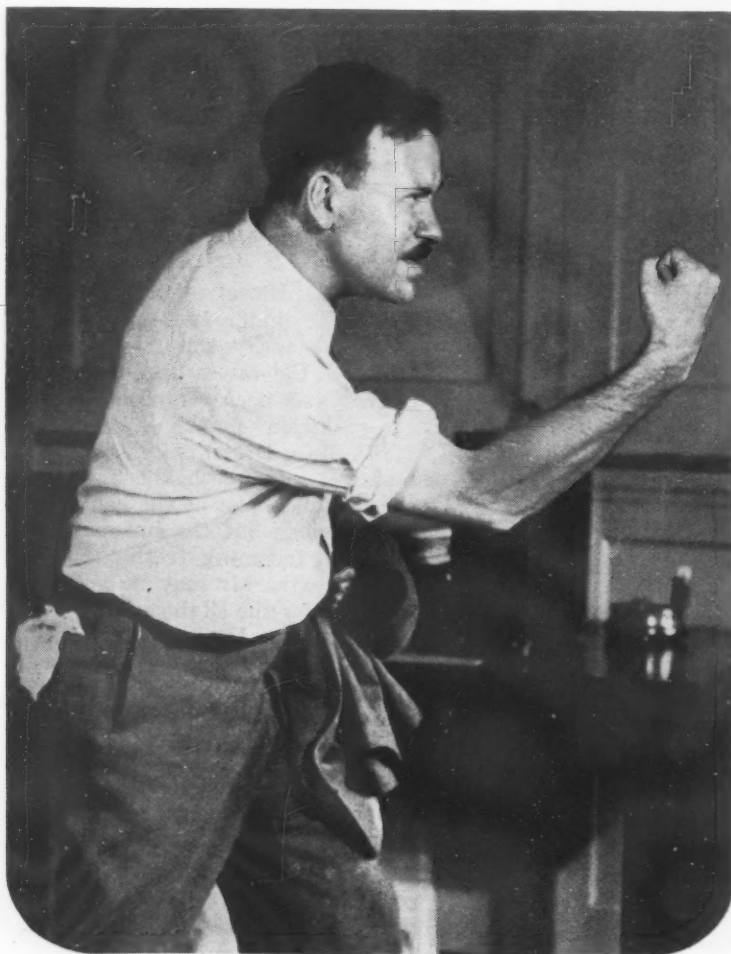
"Thus a two-cycle Diesel engine is simply a conventional four-cycle type gasoline engine structure, made stronger to withstand the higher explosion pressures, with the valves arranged to be open at the same time, and with a blower added to fill the cylinders and push out the exhaust gases. The additional power resulting from twice as many power impulses per cylinder more than offsets the added weight of the stronger parts and the blower, and thus places the two-cycle Diesel engine on a direct competitive basis, with gasoline engines as regards size, weight and power, with the added advantage of a very considerable saving in fuel."

The specific fuel consumption of these engines, by the way, is given as 0.45 lb. per hp-hr.

The cylinders are in a single casting and are provided with dry liners.

(Continued on page 49)

Total No. of Gear Lubricant Dispensers	Major Operated 7-1	Major Leased 7-2	Independent 7-3	General Repair 7-4	Storage 7-5	Car Dealers 7-6	Total	Grand-Total of All Outlets Who	Have	Not	Total
One	5	26	89	57	8	163	348	Hand-Operated High Pressure Gun	1317	1398	2705
Two	12	64	241	102	22	509	950	Universal Joint Oil in Hand-Gun	898	1807	2705
Three	5	22	197	54	8	288	584	Universal Joint Grease in Hand-Gun	2452	253	2705
Four	14	32	129	32	9	177	393	Water Pump in Hand-Gun	2471	234	2705
Five	10	17	36	17	2	65	147	Wheel Bearing Grease in Hand-Gun	2131	574	2705
Six	11	5	29	6	2	56	109	Steering Gear Grease in Hand-Gun	1912	793	2705
Seven	9	2	19	2		28	60	Centralized Pressure Chassis Lubrica- tion System or Air-Operated High Pressure Gun	2276	429	2705
Eight	5	1	10	1		17	34				
Nine	5	1	3			5	14				
Ten	1	1	5			6	13				
Total	77	171	758	271	51	1314	2642				
No Report							63				



Don't Cuss Competition

**It may be your own fault if
you're losing business**

DON'T blame competition if you are not getting your share of automotive repair business, but check over your equipment and see how it stacks up with other shops in your neighborhood. Particularly check it with those shops that are making money.

In a recent survey made by the Valvoline Oil Co., only 26 out of 271 general repair shops investigated had enough gear lubricant dispensers to handle the five different types of gear lubricant that are required to properly lubricate cars. On a percentage basis this is only 9.6 per cent.

Another and equally interesting deduction from the survey is that the only type of service station that may be considered adequately equipped to lubricate cars are those filling stations which are operated by the major oil companies. 53.2 per cent of such stations have five or more gear lubricant dispensers. Other types of stations are very little better than the general repair shop.

In other words, the dear public which pays the rent is not likely to get a good lubrication job if it drives into a general repair shop, or any other for that matter, with

the possible exception of some of the major oil company stations.

There is no doubt that profits come to the well equipped shop and instead of cussing the competition of other stations, regardless of their type, the thing to do is to get adequate equipment that will handle all types of cars.

Don't make the mistake in thinking that if you have one gear lubricant dispenser, that you are prepared to lubricate all makes of cars. The minimum number of gear lubricants that are required to lubricate today's cars is five.

As shown by the data, compiled in the tables herewith, the Valvoline survey covered 2705 stations of six different types and, in addition to gear dispensers, included other types of lubricant dispensers.

With such a large percentage of the stations being under-equipped, there is undoubtedly a big opportunity for the general repair shop owner to increase his business by installing the necessary lubricating equipment.



*"It don't say anything in the manual
about a battery havin' these!"*



How to Blend Racing

**The possibilities for improved power output
presented by the use of fuel blends**

UNDER the new International Formula adopted for motor car racing in this country many former restrictions have been removed. Of primary importance are the changes in engine and fuel specifications. Normal induction and supercharged engines are now permitted, the displacement of the former being limited to 274.59 cu. in. while the supercharger jobs will have to manage with 183.06 cubic inches. Minimum weight in each

class is governed by displacement.

The new rules apply to all sanctioned racing both here and abroad and involve changes in the specifications in force previously on both continents. For the first time in many years foreign and American cars will race on an equal footing in any country. The new Formula should do much to stabilize racing in this country and to stimulate public interest. It will remain in force for at least three years, giv-

ing builders an opportunity to develop designs to a high degree of efficiency. Foreign entries will be attracted to Indianapolis and other tracks adding color and interest as they have at Roosevelt Raceway.

Fuel specifications are entirely changed with restrictions removed concerning the character of the fuel, the amount used and the fuel tank capacity. The choice of fuel is thus limited only by the requirements of the engine and the build-



Fuels

er's knowledge. European contestants in the Vanderbilt Cup races have indicated the possibilities for improved power development and performance by the use of fuel blends accurately adjusted to the requirements of the engine and the racing conditions.

In the past American racing fuels have been evolved primarily for the Indianapolis Race and usually the same formula has been employed in a given car for all other

racing during the season. The blends of greatest popularity have consisted of a special California Aviation gasoline with tetraethyl lead and usually some benzol. Such blends have served excellently in the past but they do not necessarily represent the ultimate in power development for the new engines now being developed.

A basic knowledge concerning the fuels available, their essential characteristics and their possibilities for improved power development should be useful to both builders and drivers. With this information and the basic engine characteristics established one can be balanced against the other to produce the results desired to a maximum degree.

In approaching this problem consideration should first be given to the type of racing, that is long distance speedway racing, road racing or sprint races.

Our next concern is the engine about which we should know: a. The range of operating speeds; b. the compression ratio and amount of supercharging, if any, so that the total compression pressures at operating speeds will be known; c. average water jacket temperatures at racing speeds; d. temperature of the inlet gases and boost temperatures attained.

To insure accurate and satisfactory results and also in the interest of time saving most of the fuel research work should be done with the engine on a well equipped dynamometer. Only under care-

fully controlled conditions can accurate comparisons of power output, speed and other important factors be made. The final tuning up will, of course, be done under actual racing conditions but this should be preceded by careful work on the dynamometer.

The materials readily available for blending racing fuels are:

GASOLINE, which may be had with a great variety of characteristics as to specific gravity, volatility range, octane number, etc. California Aviation with high octane rating and other specifications as shown in the chart is usually preferred.

NATURAL GASOLINE, a very volatile product with high octane number, is a valuable blending agent. Small quantities will improve distributing and anti-knock, smoothing out engine operation.

MOTOR BENZOL comes in several grades. The most suitable has a volatility such that 90 per cent boils over at 212 deg. Fahr. It has high calorific value, improving power and specific fuel consumption in the finished blend but it shows a definite tendency to detonate at high compressions and at high duty shows higher cylinder head temperature.

TOLUOL, an ingredient of most motor benzol, is useful as a separate fuel constituent having higher anti-knock rating and less tendency to preignite at high temperatures and pressures. Its calorific value is also better.

(Continued on page 40)

Essential Data on Fuel Blending Materials.

Material	Spec. Grav. 60 F.	Boiling Point Deg. F.	Low Calorific Value		Low Latent Heat Value BTU/lb	Jet Area % of Gasoline
			BTU/lb	BTU/gal		
California Aviation	0.690	104-176	19150	112708	135	100
Gasoline (40-80 C)		avg. 140				
California Aviation	0.730	122-302	18900	115762	135	100
Gasoline (50-150 C)	0.740	avg. 212				
Natural Gasoline	0.660	90-130	20500	110094	161	165
Petroleum Ether		avg. 110				
Benzol (90s)	0.878	90% over at 212	17535	128298	162	90
Toluol	0.870	230	18300	132522	160	87
Methanol	0.796	148	8940	59333	480-515	195
Methyl Alcohol					avg. 500	
Ethyl Alcohol	0.798	172-212	11480	76166	320-400	151
		avg. 192			avg. 385	
Acetone C. P.	0.798	132	12350	82033	235	142
Ethyl Ether	0.735	95	12025	73617	160	157

Tetraethyl Lead in the quantities used influences octane rating only.

Note—The approximate jet area required is based on gasoline as 100%. Jet area varies inversely as the calorific value of the fuel, BTU per gal. Latent heat is at constant pressure, atmospheric. Calorific value is average (estimated) excluding latent heat.

See Chart on Page 40 for Suggested Fuel Blends

By
FREDERIC R. SPEED



Studebaker Propeller Shaft

If, for any reason, it is found necessary to replace the propeller shaft on a 1937 Studebaker series car, it is essential to install a complete propeller shaft and universal joint assembly. Also the flange at the transmission shaft and at the rear axle pinion shaft. In addition, care must be taken to make sure that the marks, consisting of arrows on the needle bearing joint type or punch marks on the rubber insulated type are in alignment. Extreme caution should be taken to see that the universal joints are securely tightened.

Pontiac Hard Starting

Upon investigating recent reports of hard starting on 1937 Pontiac six cylinder cars, it was found that the adjustment of the starter and accelerator linkage was not being checked. To get proper throttle opening during starting, it is important that no clearance be allowed on the linkage connecting the starter pedal when the pedal is depressed to the starting position.



"Yup — it's a two car mirage!"

Service Hints

from

The Factories

Chevrolet Thermostats

To get the maximum heating efficiency from a hot water heater, the highest degree opening thermostat possible should be used.

There are three types of thermostats that may be used with anti-freeze in the 1938 Chevrolet passenger cars and trucks: Namely, the 142 deg. thermostat—Part No. 3108572, the 150 deg. thermostat—Part No. 985127, and the 160 deg. thermostat—Part No. 985128. The 1938 passenger cars and trucks are shipped from the Assembly line with a 142 deg. thermostat. This thermostat should be used with non-permanent anti-freeze—such as alcohol, methanol, etc. Non-permanent anti-freeze when used with the overflow return tank, Part No. 985319, will permit the use of 150 deg. thermostat. When permanent anti-freeze is used in the cooling system it is recommended that the 160 deg. thermostat be used.

Centering Studebaker Brake Backing Plate

If, for any reason, the brake backing plate bolts on all models from 1934 to 1938 except the 1935 Commander 1B and the President 1C are disturbed, the brake backing plate should be carefully centered on the axle housing around the steering knuckle before the bolts are tightened. If the brake backing plates are not properly centered, it will be impossible to obtain proper brake shoe clearance. In addition, the brake shoe clearance must be checked and reestablished as required, after such an operation is performed.

Olds Frame Interchangeability

The frame of 1938 Olds cars may be used on the 1937 cars with the following changes:

1—When the 1938 frame is used on a 1937 car, a 1937 shackle may be used by substituting a thick wall bushing at the upper end where the shackle attaches to the frame bracket. The part number for the 1938 thick wall spring shackle bushing is—No. 409247.

2—The two $2\frac{1}{4}$ in. holes on the left hand side of the front cross member for the fuel line bracket must be redrilled $1\frac{1}{8}$ in. closer to the center line of the frame.

3—The battery support part No. 408837 must be bolted to the X member and side member on the left hand side of the frame.

Pontiac Vibration

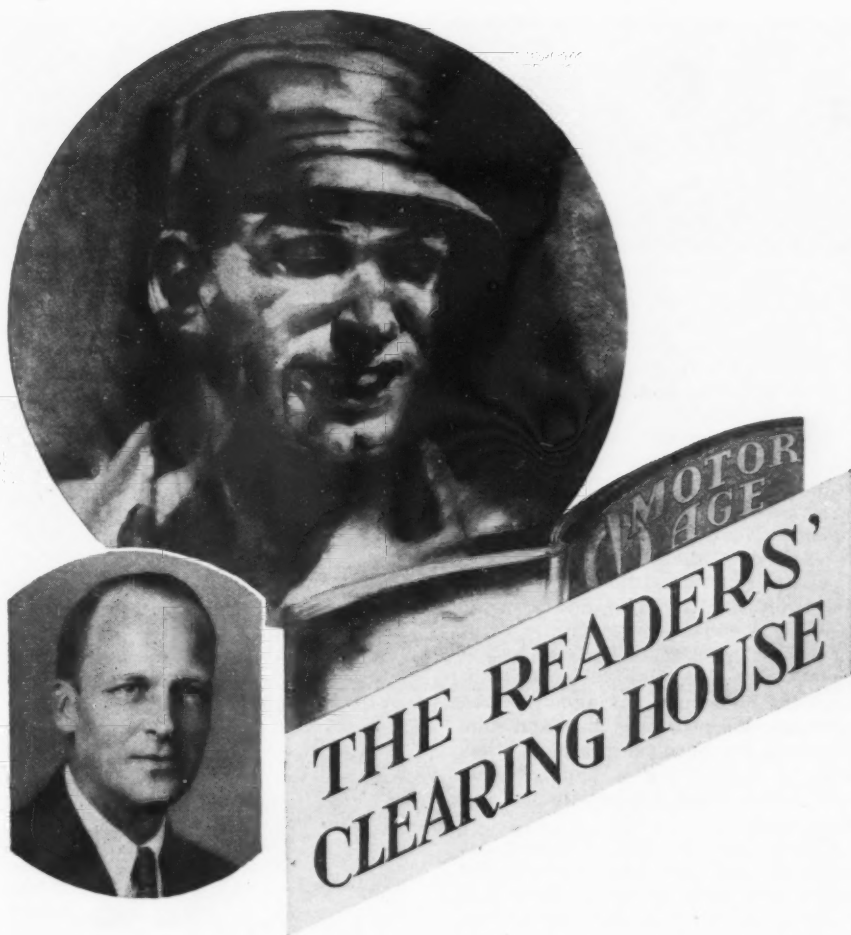
Should a vibration be found at the top center bow in the body of the two and four-door 1938 Pontiac sedans, it should be corrected as follows: 1—Remove the dome light cover. 2—Remove the dome light body. 3—Insert blue wadding or cotton or any soft material in between the dome light block and the turret top panel, forcing toward the front or center top bow. This will stop vibration. Replace dome light body and cover.

Studebaker Oil Leaks

In cases of excessive oil consumption, the possibilities of leaks around the rear main bearing cap oil seals should be carefully checked. An improvement has been made in the oil treatment of the wood seals and only the latest type seal will be carried in service stock. The installation of the seal can be facilitated if the edges of the groove openings are chamfered slightly with a small file before the seal is inserted. Care should be taken to prevent breaking the seal when making the installation.

Chevrolet King Pin Bushings

An oversized king pin bushing has been released for Chevrolet axles when king pin bearing bores have been reamed oversize with a steering knuckle bushing reamer. This new bushing may be used on 1934, 1935, 1936 and 1937 knee action model passenger cars and is available under Chevrolet Part No. 603076.



BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of Motor Age together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

TRANSMISSION THUMP

Regarding an Essex-Terraplane 1932, Model K, I have worked on it for one week trying to remove a thump which appears when the car is in gear with rear wheels jacked up and motor running, and the clutch pedal is depressed in and out. The same noise is apparent when the car is driven on the road and gears are shifted.

Work done includes removal of all play from spider gears and properly adjusting rear end assembly, shim-ming axle shafts, overhauling transmission, overhauled pressure plate, new clutch disk, but the thump is still there.

Someone has suggested that the noise is due to the upper part of the main bearings being worn. Have you any idea what the thump may be?

If possibility lies in the main bearings, let me know how to remove same

and what special tools are needed. Milton Form, Jack and Al Service Station, Wyckoff & Cooper Aves., Brooklyn, N. Y.

IF the work you have done has been done carefully, you certainly should have been able to eliminate this noise. My first guess is a clutch disk with a loose hub. As you know, the damper springs around the hub sometimes break and if there is an excessive amount of movement in this clutch hub, it will produce a noise very much like the one you described. You mention that a new disk has been installed and, if you are sure that the new plate was in good condition, it would seem to eliminate this source of trouble.

Another point is the possibility of the flywheel being loose where it is bolted to the crankshaft. You would be surprised to know how often this condition comes up and, for some reason or other, it is about the last place

a fellow would think of looking for lost motion. If the bolts holding the flywheel to the crankshaft have been slightly loose at some time or other, enough to allow the flywheel to shift, the chances are they have worn the bolt holes so that now even though the nuts are drawn down tight, there is still a little movement of the flywheel when placed under a load. It would be well to check this pretty carefully.

I doubt very much whether the upper half of the rear main bearing is at fault. If it were loose enough to cause this noise, I think your principal concern would be how to stop the oil leak rather than how to stop the noise—because you would unquestionably have a major oil leak at that point.

Another thing that should be checked is the rear spring center bolt and the rear spring clips. The axle housing can be shifting on the springs just enough to give you this noise, if the center bolt is broken or the spring clips are loose.

Did you check the fit of the splines in the clutch hub and the clutch shaft? These splines usually wear and, of course, add their share of lost motion to the drive line just as much as excessive play in the gears.

BEARING LEAK

We have a 1937 1½-ton Chevrolet truck that leaks oil through the rear main bearing. The truck has over 30,000 miles now and has leaked almost from the time it first came out. The company that owns the truck have another just like it, but it is O.K. They use S.A.E. 10 oil now and 20 in the summer-time.

Here is what we have done. Checked the breather for crank case pressure, cleaned the rear main cap and ball assembly, cleaned the oil sling-off on the shaft.

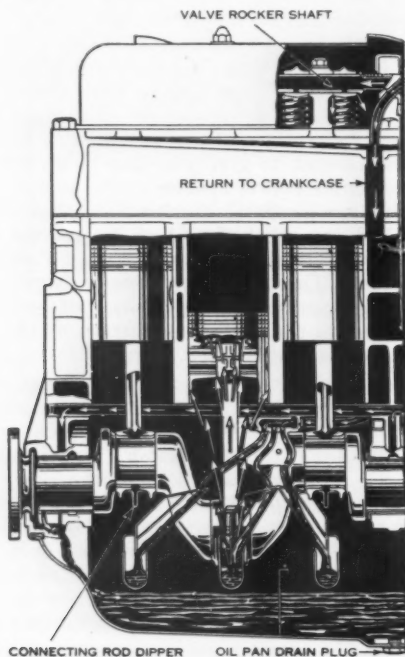
The oil appeared to be coming down from the center of the bearing a little to the camshaft side, so thought possibly the oil might be coming from the plug back of the camshaft. After removing the flywheel housing and then running the motor, we found that this was not the case.

We found the end-play on the crankshaft was .010 inch so we reduced it to .004 inch. It looks like the oil piles up in the reservoir of the main and then the oil sling throws it out. Could it be that the construction of the rear main lock be such that back pressure could build up between the lock and the counter-balance, thereby letting it be thrown out? The leak comes when the motor is running fast—25 to 30 m.p.h. under operating conditions both with a load and empty and driving at 30 to 40 m.p.h. the truck leaks out 1 quart in about 150 miles.

We have had the pan down three times trying to stop the leak and the

THE READERS' CLEARING HOUSE of SERVICE MENS' QUERIES

last time we did our best to stop it. We checked everything. Outside of the end-play we couldn't find anything wrong. The bearing has about .0015-inch clearance. How to stop the leak is what we want to know.



If there is any more about this job we have neglected to tell you that you want to know, we will be glad to tell you. If there is not and you can help us in this problem, we will appreciate

it very much. Wilford L. Johnson, 1201 South Rowley St., Mitchell, S. D.

I BELIEVE if you will carry out the following suggestions you will be able to overcome your trouble.

First, remove the rear main bearing cap and take the babbitt bearing out of the iron cap. Lift up the pin which will allow the ball check to roll out. Next, go back to the bearing cap and drill the oil return passage from the cap back into the reservoir and from the reservoir down to the oil channel, making the passage about 5/16 inch in diameter. I believe it is about 1/4 inch now. This will enlarge the oil return passage from the reservoir back to the case and this procedure has been successful in other cases in preventing a leak at this point which could not be stopped any other way.

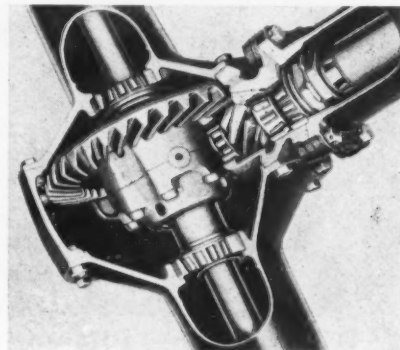
Before you do this, however, it would be well for you to check the rocker arm cover to see if there is a crack in the cover at the rear. Some of the boys tell me that occasionally these covers will crack and the oil will leak out and run down the back of the block and the result will be every appearance of a leak at the rear main bearing.

PINION SHAFT KNOCKS

I am experiencing quite a lot of trouble in trying to locate a knock in a 1937 V-8 Ford, Model 60. The knock appeared at about 400 miles and it

sounds like a universal joint knock. It only knocks at between 20 and 30 m.p.h., it knocks in all speeds, 1, 2 and 3 gear. You can't hear it while idling or coasting. The knock goes faster or slower as you feed it the gas between 20 and 30 m.p.h.

Another mechanic who specializes in Ford work told me he thinks it is the starter shaft flapping back and forth but then if it were, it would knock all the time regardless of what speed you were going. I told the owner of the car it will wear out in time but it has now 4000 miles on it and it is still there. I didn't want to start taking this man's new car all apart right away. Perhaps you can help me solve this mystery knock without taking too much of the car apart. Anton Surman, Frenchy's Garage, 424 Henry St., Elizabeth, N. J.



YOU have given me quite a job of trying to locate that knock you are experiencing on a Model 60 Ford. However, from what you have told me, I am inclined to believe that the trouble is either in the universal joint as you surmised, or more likely in the pinion shaft bearing.

I would suggest that you dismantle the rear axle and make a careful check of all bearings and gears, particularly the pinion shaft. Here's hoping that this helps you locate the trouble with a minimum amount of work.

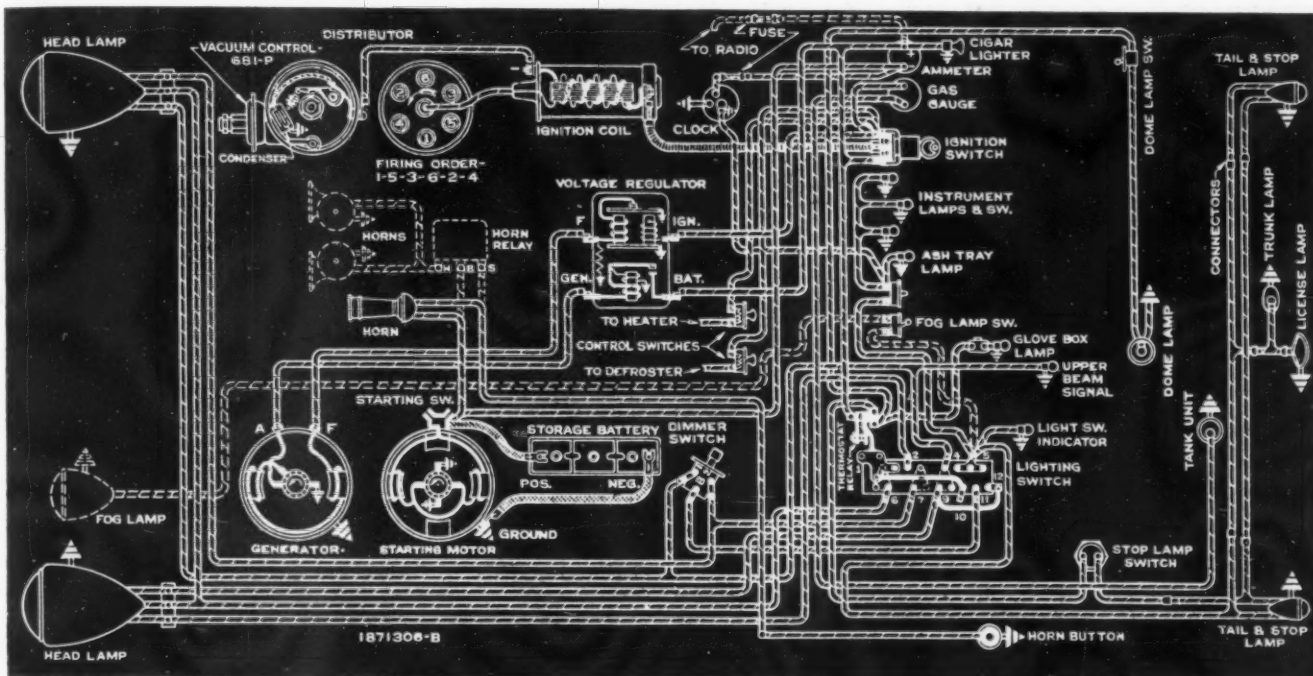
ENGINE HOWLS

I have a 1928 KC DeSoto. This car had bad compression so we ground and faced the valves, honed cylinders, put in new rings and piston expanders and pins, aligned rods, adjusted mains. The car ran swell about 1000 miles then it was speeded up to 50 miles one day and after that when you drive up grade there is no knock but when you get to the top and motor is not pulling, number two cylinder has a howling noise. I found it was in number two cylinder by running with wire off plug.

I took off the head and pan, pulled piston. There was no score in cylinder or piston. Rechecked rod, put in another set of rings, assembled and found the same noise after the car warmed up. No noise on a pull. What



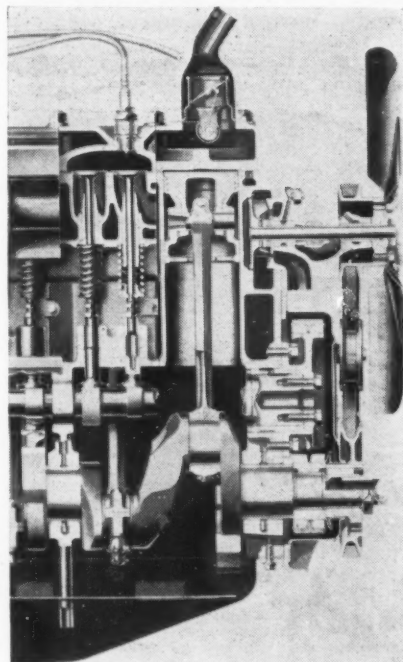
"He sent his letter to 'House and Garden' instead of Motor Age Clearing House!"



Oldsmobile 1938 Wiring Diagram

can you suggest? Paul Mellantine, Mellantine's Garage 1423 S. Muskego Ave., Milwaukee, Wis.

JUDGING from your description, I believe this noise is caused by the piston attempting to seize. Appar-



ently it does not become tight enough in the cylinder to actually seize but does become tight enough to rub on the walls and cause this howling noise. Naturally, such a condition would not develop until a certain operating temperature had been reached.

My suggestion is that you remove this No. 2 piston and give it a little more clearance at the bottom of the skirt. This can be done by dress-

ing it off with a file and I think an extra 0.002 in. of clearance should be enough to do the trick.

Do not be deceived by the fact that no score marks are evident on the cylinder wall or on the skirt of the piston. This condition sometimes occurs without leaving any visible evidence of scoring.

SLEEVES NEEDED

I have a Plymouth 1932 PA that I have rebored and installed new pistons and rings in. The car uses about a quart of oil every 50 miles. I have installed the second set of rings, checked the rear main bearings for leaks and have also checked everything for oil leaks but am unable to find any. I installed new valve packing on intake valves according to instructions but it did not help. This block was bored to .070 inch oversize and is equipped with pistons having two oil control rings.

Would incorrect valve timing have anything to do with the oil consumption? I have also plugged the oil holes in the rods. I am quite sure this car is burning the oil as it smokes like H—. H. G. Fritz, Fritz's Garage, 1427 16th St., Merced, Calif.

THIS engine, with heavy mileage, had two outstanding conditions that accounted for the major part of its oil consumption troubles. The first was an oil leak at the rear main bearing. You say that you have checked it and have been unable to find a leak. I'd suggest that you check again pretty carefully to be sure that there is no leak. Put a sheet of paper under the engine and clutch housing and let the job run at a fairly high speed. That will show up any leak, particularly out

of the clutch housing which would indicate a rear main bearing leak.

The rear main bearing has a graphite-impregnated rope for the bearing cap oil seal, both top and bottom, and the usual habit is to replace the bottom half and forget the top—but that doesn't do the trick—both top and bottom seals have to be replaced. This rope is listed as Plymouth Part Number 316336, and lists for five cents. Then, there is a metal retainer which is also in two pieces—top and bottom halves—list-



"Miss Smith, take a letter to Motor Age Clearing House!"

THE READERS' CLEARING HOUSE of SERVICE MENS' QUERIES

ed as part number 44649 at ten cents each. Inside the metal retainer is a cork oil seal, likewise in two pieces, part number 44648, priced at five cents each. In between the metal retainer and the bearing cap is a paper gasket, upper and lower halves, which will set you back ten cents per dozen. All of these parts must be replaced at one time if you are to get a good seal to prevent oil leaks out of the rear main bearing.

Has someone installed a combination fuel and vacuum pump on this job to help the windshield wiper operation? If so, then I would take a bet that the vacuum pump diaphragm is cracked and is pumping oil into the intake manifold. Of course, if the job doesn't have the vacuum pump, it can't be the cause of the trouble.

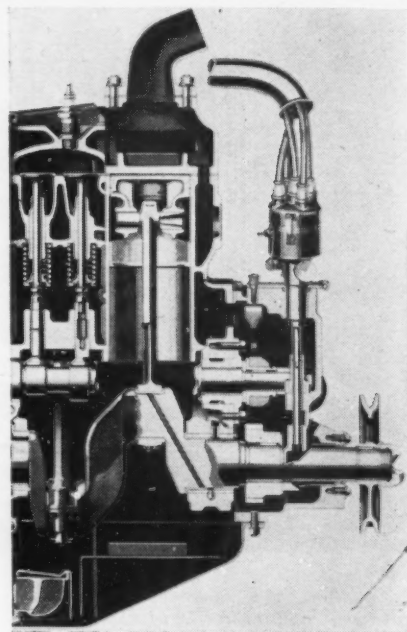
Incorrect valve timing would have no effect on oil consumption—at least I can't figure out why it should.

There is always the possibility that the rebore job left the cylinders rough and that it will take time for them

to smooth up so that the rings will seat properly. Your letter doesn't mention how far the job has been driven since the second set of rings was installed.

If there are no leaks, and if the valve guide packing you installed is doing a good job, then the trouble is almost certain to be due to distortion of the cylinders under the tension of the head bolts and heat. In taking .070 in. out of those cylinders, I would say you had just about gone the limit. I have checked this point pretty carefully and I am sure that your cylinder walls now are much too thin and I doubt if you will be able to do anything about it unless you put in cylinder sleeves. The cylinders will be pulled out of shape by the tension of the head bolts, but will go back to their original shape when the tension is relieved. That is the reason you are unable to find that the rings do not fit properly—they do, while you are fitting them. Much the same action takes place when the cylinders get hot.

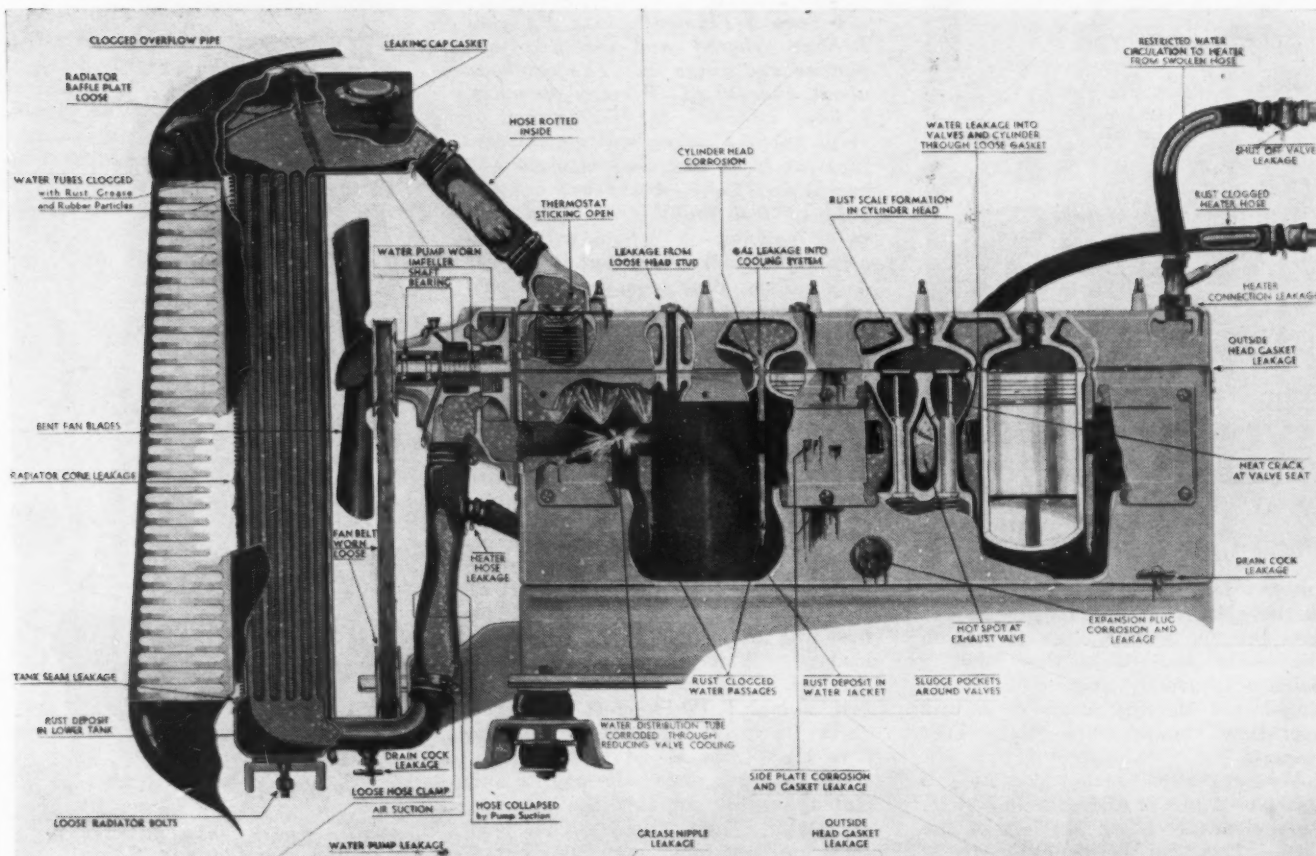
So, aside from the points mentioned above, which depend on your workmanship, I'm afraid you have a condition here that is hopeless unless you decide to put in sleeves.

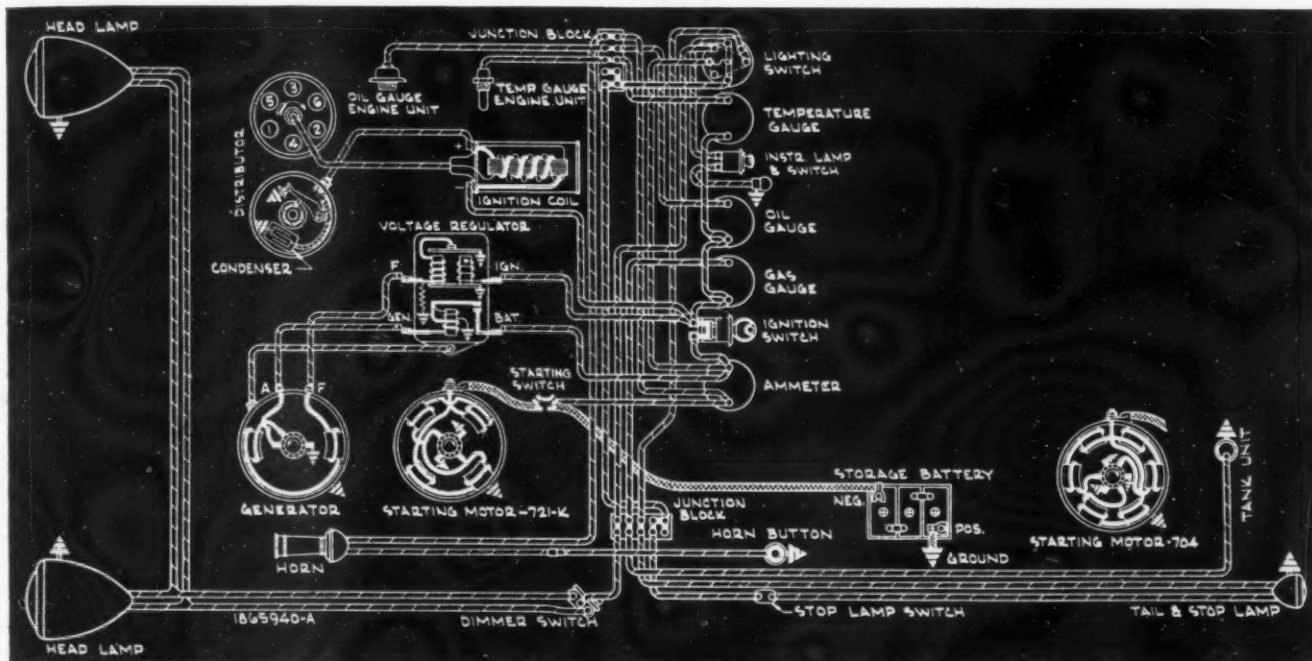


TRUCK TROUBLES

We are having a great deal of trouble with the rear main bearing on a 1931 Reo truck, leaking oil. It is a 1½-ton truck with a J214 Buda engine. We installed a new rear main

The chart below is reprinted through the courtesy of the National Carbon Co., Inc. It shows points in the automobile cooling system where trouble may result from neglect of servicing any make of car.





International Truck 1937-38 Wiring Diagram

bearing and this did not help. We then took the pan off and ground the lower half of the bearing.

The bearing has a large drain pipe but the oil seems to leak into the bell housing instead of through the return pipe.

We would appreciate any information you can give us to help remedy this condition. William Duggan, c/o Nissen's Garage, 2901 Sheffield Ave., Chicago, Ill.

I HAVE done some investigating about this condition and find that there are two things that have to be done. First, the upper and lower half of the rear main bearing have to be replaced. These are shell type bearings and can be rolled out without having to pull the crankshaft. At the time these bearings are replaced, it is also necessary to replace the upper and lower oil seals. Some models of this engine used cork seals and some used wooden seals. In either case, it is important that you check to see that the oil seals meet at the junction of the upper and lower halves. If they are short so as to leave a gap between the two halves, an oil leak is certain to result.

Another point is the drain pipe leading from the bearing to the crankcase. This pipe is usually too long so that the lower end is below the oil level. This sets up a pressure and prevents the oil from draining away from the bearing. The answer is to cut off from $\frac{1}{4}$ to $\frac{1}{2}$ inch of this drain pipe so as to be sure that the lower end will be above the oil level.

Since you have already replaced the bearing, it may be that cutting off a piece of this pipe will do the trick for you. If, however, you did not replace the upper half of the bearing, I suggest you do this to be sure the bearing itself is in good condition.

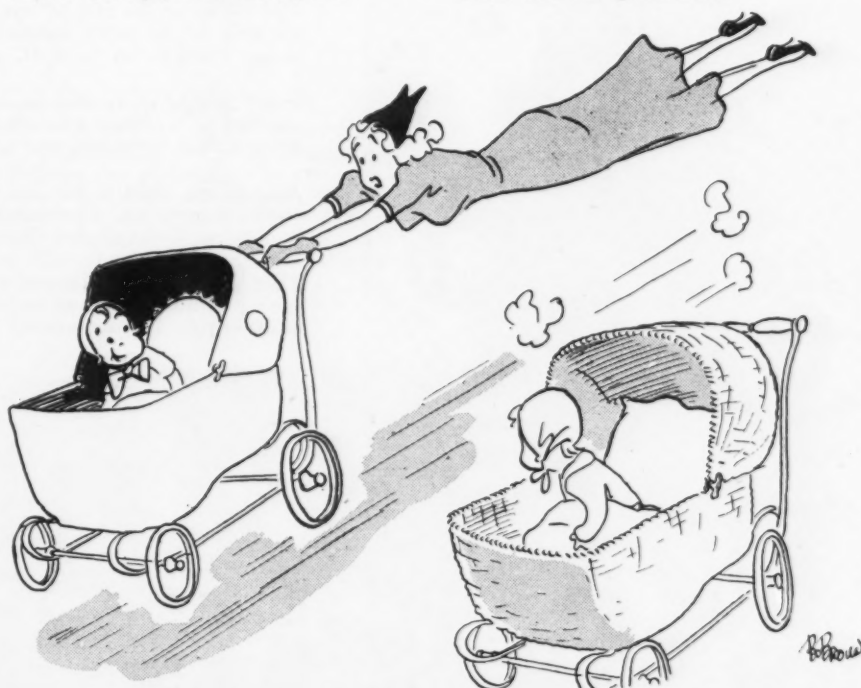
LIGHTS FADE

I am having a little trouble with the lights on a 1936 Plymouth. Would appreciate it if you could give me some information as to what the trouble is.

The lights will dim too much when you apply the brake. Also, the lights will brighten up when you speed the motor. I have installed a new battery, put on an extra ground from transmission to frame and set generator so when all lights are on, the ammeter registers zero. This helped some, but the lights still dim too much when brake is applied. The Corner Garage, Greenwood, Va.

WHEN the lights flare up with increased engine speed, it is evidence of a loose connection between the generator and the battery. I suggest that you carefully check all of the electrical connections in this circuit including the connections on the ammeter and the battery ground strap as well as terminals at battery.

The fact that the lights dim when the brake is applied indicates a short in the stop light switch or in the wires leading from the switch to the lights. The stop light switch is very inexpensive and it would be well to replace it with a new one, checking the switch to the light to be sure the wires are not grounded.



"Motor Age Clearing House told me how to step it up!"



Await Favorable Weather For Speed Trials

Faced with the necessity of working the "bugs" from brand new engine designs resulting from the International Formula of rules, the racing fraternity was waiting favorable weather conditions for the first trial runs on the Indianapolis Speedway.

So far this season, the "very bad" weather in the Indiana city has resulted in the drivers and car owners postponing attempts to try out their new mounts on the two-and-one-half mile brick course. In other years, drivers have taken to the track at the first break in the weather, which has often come in January.

Although drivers have not released their definite plans and the speedway office was awaiting verification of the car owners, a number of new machines were being prepared in Indianapolis and others were being rebuilt to conform to the new specifications. It was said that several cars being built on the West Coast and in other sections would arrive in Indianapolis in late March or early April for the long process of arriving at a perfect "combination."

Qualification trials, the process of selecting the 33 fastest cars to make up the field of starters, probably will get under way on Saturday, May 14. Last year, trials opened on May 15 and in 1936 on May 16, to provide qualifications on two week-ends. With Memorial Day and the race coming on Monday this year, the track likely will be closed on Sunday for the pre-race scrubbing. The qualifications likely will end on Saturday, May 28.

Under the new international formula adopted by the International Association of Recognized Automobile Clubs with headquarters in Paris, France, and approved by the Ameri-

can Automobile Association's Contest Board, every one of the Indianapolis entrants this year will have undergone radical changes in design before race time approaches. Under the rules, displacement is restricted according to the car weight and a general letting down of the bars on many prior restrictions takes place.

How many European speed headliners will be attracted to the United States this year, the first appearance at Indianapolis in many years, as a result of the uniform rules could not be verified at speedway offices at this early date.

No entries had yet been announced, although it is known in reliable quarters that "Pop" Myers, the guiding genius of the running of the annual 500-Mile International Sweepstakes has several "good ones" up his sleeve. Early announcement is anticipated.

Even word of the first American entry, usually a pre-Christmas announcement, has not yet come forth. The delay is occasioned by uncertainty of many of the drivers as to what motor specifications they will select in the final analysis after "toying" with a variety of ideas. The Indianapolis entry form requires the driver to list the detailed specifications and measurements of the car.

Next Month

Motor Age will present complete tune-up data and specifications on 1938 cars in the special April Service and Tune-up Issue.

Don't Miss It!

Down the Column:

Speed up to 40 m.p.h. was shown by these model cars at the recent meeting of the newly formed Model Car Racing Association. The cars range from 6 in. to 2 ft. in length, are powered by rubber bands.

Half blade propeller makes its first appearance in London. It is claimed to facilitate take-off in half the usual distance, higher altitude, greater fuel economy, less vibration and 25% greater thrust.

Awesome sight is this gas masked Nazi soldier all set to go into the enemy's territory. Looking like a "man from Mars" he's part of the motorized unit of the Reich army, important in Nazi militarism.

Thin ice holds no terrors for Charles Bruce. In his homemade off-spring of boat, sled and airplane he skims over the St. Lawrence River at 80 m.p.h. It runs equally well on ice or in water.



Down the Column:

One of the few women service station operators in the country, Miss Dorothy Stewart, of Syracuse, N. Y., as she appeared at a recent tax hearing, claiming gas taxes equal 47 per cent of the retail price.

Fool-proof contraption erected in Detroit suburb to stop harmlessly cars speeding out of control. Cars slide up the rails and stop. It is credited with having saved 24 lives since its erection.

The law made W. J. Hayes, of Seattle, purchase license tags and certificate of title to his wheel chair when he changed hand power to motor power. It has a top speed of 16 m.p.h.; 75 miles per gallon.

Timid Miss Bessie Williams of Jacksonville, Fla., feared for her car's fenders on the narrow curving drive to her garage. A carpenter made the track for her. Once on it, no steering worries at all.

Model show at New York included this steam tractor built to one-twelfth scale. Took George Hartness, of Portland, 1500 hours to build. It actually works, even the tiniest control functioning properly.

TAXES=467% of SALES



Senator Sees No Immediate "Dream Highways"

Lonergan Ridicules \$8,000,000,000 Plan of Bulkley

Congressional enthusiasts of national super-highway networks are vying for the honor of being the first to propose a plan sound enough to make it a reality rather than a myth.

Senator Lonergan, Democrat, of Connecticut, ridiculed the idea of building "dream" highways overnight after Senator Bulkley, of Ohio, suggested an \$8,000,000,000 road-building program which he promised could be completely self-liquidating.

Lonergan advanced a plan similar to Bulkley's several months ago and turned it over to the Bureau of Public Roads for study. Conferences with bureau officials convinced him, the Senator said, that "it is impossible at this time to contemplate the immediate construction of transcontinental highways and expect them to be self-liquidating."

He announced plans to introduce a bill to establish a board within the Bureau of Public Roads whose job would be to direct a 20-year program for the construction of transcontinental highways, units of which would be designed for maximum road safety and financed by toll charges until the cost is liquidated.

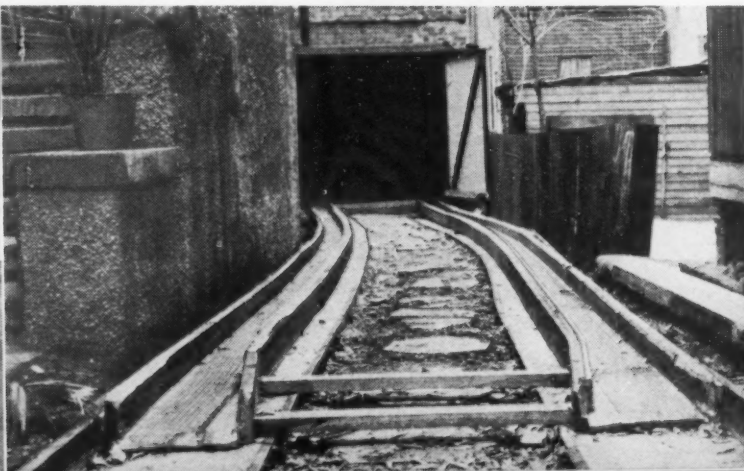
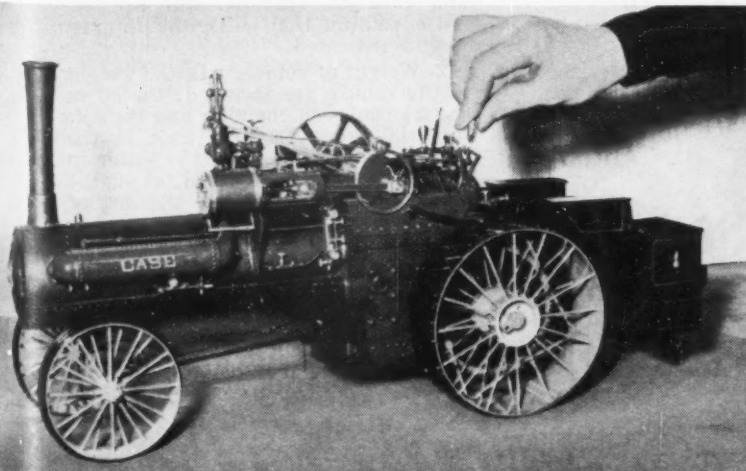
A survey undertaken by the bureau indicates that "the actual need at present is for hundreds of small toll projects to take traffic around cities

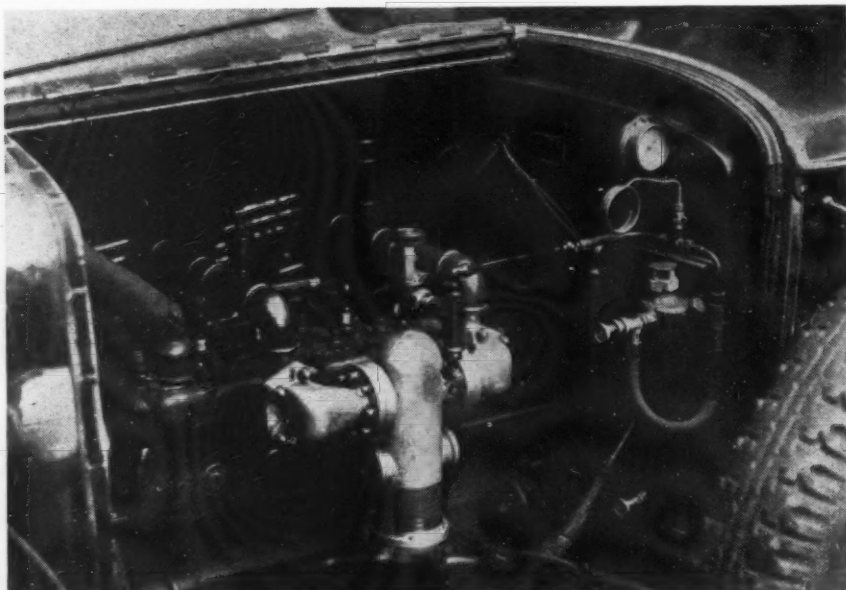
and to avoid railroad grade crossings while at the same time absorbing existing units of the public roads system which are of boulevard width and which comply with safety requirements," Lonergan said.

Further reflecting the attitude of the bureau, the Senator conceded that traffic volume west of Chicago does not tax existing roads except, perhaps, at cities, where, he said, "toll bypasses could be erected as a start." He also recognized the high cost of obtaining rights-of-way, pointing out that it would absorb too much of the cost to undertake super-highways without absorbing parts of the regular public roads system.

He advanced the idea, however, that after directional routes were laid out by a planning agency, a method could be arrived at whereby States would grant rights-of-way or be required to use Federal highway or work-relief funds for building roads connecting with the special highway system.

President Roosevelt said on Tuesday that he favored the general idea of building super-highways and was studying the problem in an attempt to arrive at some practical plan. He indicated that a plan calling for toll roads and providing for the principle of "excess condemnation" might prove to be practicable.





Two ingenious mechanics, brothers Anthony and Michael Fonzo, recently astounded Rome with what is said to be the first automobile run with acetylene gas. A generator inducing automatic carburetion, giving a powerful stroke and leaving little residue, is said to be superior in motive power to other auto fuels. The "calcium carburetor" feeds the 8-cycle motor.

Do-Ray Clearance Lamp

A new streamlined "all glass" clearance lamp is announced by the Do-Ray Lamp Co., 1458 S. Michigan Ave., Chicago, Ill.

The new Zephyr, as it is called, incorporates an entirely new method of assembly that greatly simplifies installing and the changing of bulbs. The lens is held firmly on a metal base protected by a resilient rubber gasket. A heavy rubber pad under the metal base permits installation on a wide range of body curvatures. Shocks are cushioned and the construction is dust-proof and water-proof. The light uses a 1½ cp. bulb.

Available with red, amber, green or white lenses, and is furnished in chrome (No. 400) at \$1.00 list, and in black enamel (No. 401) at \$0.90 list.

To Use Internat'l Formula for Dirt Tracks

The A. A. A. Contest Board at its annual meeting in New York on Jan. 16 and 17 unanimously adopted the International Formula Motor Specifications to apply to all dirt track races for the years of 1938, 1939, 1940 inclusive.

This action by the board followed requests from the fraternity for uniform specifications for both the dirt tracks and major speedways.

The board considered the question of body requirements for dirt track cars, but it was their opinion that the type of bodies be left as optional due to the specialized nature of this type of racing.

Therefore in line with the board's

Opposition to "Super Highways" Grows in New Jersey

Strong opposition to continued spending of millions of dollars in the development of expensive highways "far beyond the ability of the motorist taxpayers to pay for them" is growing among the motorist taxpayers of New Jersey.

Latest faggot which has kindled anew the flame of opposition is the proposal to spend \$25,000,000 to connect Route 10 at Livingston with the new Liberty tunnel under the Hudson River. The distance is about 15 miles, making the cost of the proposed connecting road approximately \$1,500,000 per mile.

Leading in the opposition to such an extraordinary expenditure is Mayor Charles Martens of East Orange, who said in a recent statement: "I wonder if we all realize what such a vast expenditure means to each of us. Are there not enough roads to carry us everywhere without spending millions more? Would it not be advisable to go a little slower with vast expenditures?" The cost of that 15-mile stretch of roadway would amount to \$25 each for the one million motorists in the state.



"I'll have to take your fan off and have a look!"

decision, all cars competing in dirt track events in 1938, 1939 and 1940 must comply with the following portion of the International Formula:

1. Vehicles admitted: (a) Vehicles without supercharger—Minimum cylinder capacity 1000 cc. (61 cu. in.) must weigh at least 400 kg. (882 lb.); maximum cylinder capacity 4500 cc. (274 cu. in.) must weigh at least 850 kg. (1874 lb.). (b) Vehicles with supercharger—Minimum cylinder capacity 666 cc. (40.64 cu. in.) must have a minimum weight of 400 kg. (882 lb.); maximum cylinder capacity 3000 cc. (183 cu. in.) must have a minimum weight of 850 kg. (1874 lb.).

From the aforementioned, it results that for vehicles without supercharger to all increases of 10 cc. (0.61 cu. in.) in cylinder capacity above 1 liter (61 cu. in.) there occurs a corresponding increase of about 1.285 kg. (2.83 lb.) in weight, and that for vehicles with supercharger, to all increases of 10 cc. (0.61 cu. in.) in cylinder capacity above 666 cc. (40.64 cu. in.) there occurs a corresponding increase of 1.928 kg. (4.25 lb.) in weight. Thus, all vehicles without supercharger between 1000 cc. (61 cu. in.) and 4500 cc. (274 cu. in.) and all vehicles with supercharger between 666 cc. (40.64 cu. in.) and 3000 cc. (183 cu. in.) are admitted within the limits of minimum weight indicated.

2. Weight of vehicles: In the weight of the vehicle are included: the oil in the transmission chamber and the differential, and the tires used in the race. It does not include the water in the radiator, the oil carried for engine lubrication, the gasoline, the set of tools and the spare wheels.

3. Fuel: The selection of fuel is entirely free.

4. Validity of the formula: The formula shall be in effect for the years 1938, 1939 and 1940 inclusive.

Emergency Is No Excuse for Carelessness

Is an automobile repair shop legally and financially liable for injury to a business visitor at the shop resulting from an emergency situation?

A visitor to a New York auto painting shop who was there on business, was injured by a pail of burning naphtha being thrown upon him by an employee of the company. An emergency arose, and the employee simply used bad judgment in throwing away the pail of burning naphtha in the manner in which he did.

Ordinarily, one who is caught in a sudden emergency will not be held liable if he does not use the best possible judgment on the spur of the moment and if damage or injury results from his emergency action. This was the contention made by the auto painting shop when the business visitor brought suit for his injuries. It developed, however, that the emergency which caused the employee to throw the pail of burning naphtha, was the result of the company's own carelessness in the management of the shop. The New York court therefore decided that the company was legally and financially liable for the injuries.

"The alleged emergency," said the court, "arose as a consequence of the company's own negligence. Under such circumstances, exculpation is not

Octane Requirements For Cars Vary

Results of Tests Made by Cooperative Fuel Research Committee

The data on octane number requirements obtained by the Cooperative Fuel Research Committee during the past year on 24 different makes of cars indicated that there was a considerable spread between different car makes. There was even considerable spread among different cars of the same make. About 30 per cent of the cars irrespective of car make required fuels above 70 octane number for complete freedom from knock for sea level operation. This was without taking advantage of any of the adjustments provided by the car manufacturer to modify the octane requirement. The average requirement for all cars without modification was 66 octane number. There were no outstanding differences between cars in different price groups.

No allowance was made for unusual carbon deposits or scaling in water jackets beyond the stipulation that the cars should have been driven at least 3000 miles prior to the tests.

The tests indicated that the octane requirement was particularly sensitive to spark timing. On the average, one degree in spark advance was equivalent to two octane numbers. The octane requirement of a car, or its tendency to knock on any given fuel was therefore largely dependent upon the initial spark setting and the operation of the automatic advance mechanism in the distributor.

The effect of changes in altitude was such that a change of about three octane numbers in octane requirement per inch of mercury change in air pressure was produced in several cars of different make, data for which



Fireproof, Wooden Station. City ordinances forbid filling stations of wood construction, but we wonder what complaint they could find against this filling station of W. G. Brown, in Lamar, Colorado. True, it is built of wood. But, this happens to be petrified wood, equivalent to stone in fire resistance.

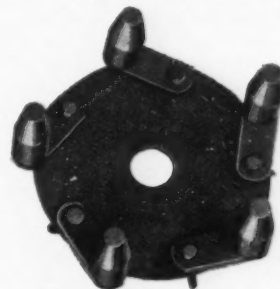
This material, estimated to be 175 million years old, comes from the petrified forest, about 30 miles south of Lamar. Besides being fireproof, this timber is well nigh wearproof and as strong as iron. Mr. Brown estimates the timber used for the floor, walls and ceiling of his filling station weighs close to one hundred thousand pounds.

available to the company operating the shop under the claim that the employee's act was due to an error of judgment during an emergency."

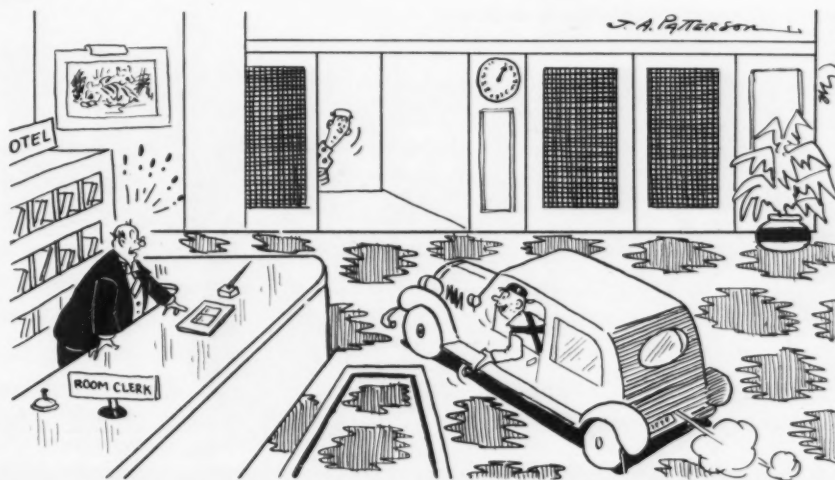
Balances Wheels

Without Hub & Drum

The Harley C. Loney Co., 16517 Wisconsin Ave., Detroit, Mich., has announced an adapter for use in balancing wheels without the hub and drum. It is adjustable for all wheel



sizes and is universal in its application to all wheel balancing machines. For complete information, write the manufacturer.



"The gentleman in 1399 wants me to deliver his car to him!"

Automotive World Loses Industrial Leader

Few men who have climbed to fame and fortune as world renowned industrialists have clung so closely to the human side of life as did Harvey Firestone, builder of the vast industrial empire that bore his name and that reached around the world. At the age of 69 he died peacefully in his sleep, Feb. 7, at his winter estate at Miami Beach, Fla. Few industrialists ever maintained so close and intimate a grasp of their business as did Mr. Firestone.

Mr. Firestone believed in being supreme. His was essentially a one-man control from the time he founded his vast rubber and tire business

37 years ago in a dilapidated carriage factory in South Akron with a mere handful of employees. But withal, his doctrine of supreme rule, his seeming severity at times and his stern conduct of business, he was human. He liked nothing better than to leave his luxuriously furnished Akron office, drive to his farm near his birthplace in Columbiana County, sit around on the crackerbarrels with his old crony associates in the village store and swap stories; or to shed his fastidious business dress which always included a boutonniere, to don overalls and straw hat and mount a giant rubber-tired tractor on his immense farm.

Trefz On Lecture Tour

On Feb. 25, Walter Trefz, well-known service engineer of Aluminum Industries, Inc., Cincinnati, Ohio, manufacturer of Permite Products, gave an interesting and instructive talk entitled "Taming the Modern Engine," before a large audience of automotive repairmen and mechanics under the auspices of the Motor Hardware & Equipment Co., F. N. Dorland, and National Auto Parts Company, at San Diego, Cal.

According to announcement of Aluminum Industries, this was the first of a series of meetings in various cities to be addressed on this same subject by Mr. Trefz during his Pacific Coast tour of several weeks under the auspices of leading automotive distributors.

The automotive industry recognizes Walter Trefz as one of the foremost authorities on internal combustion engines and their servicing. His unusual ability to diagnose and solve engine service problems is attributed to a broad experience, which includes his work as an officer in the U. S. Army Air Service during the World War, principal in charge of mechanical instruction at University Airlines key school and service engineer for one of the largest manufacturers of automobile engines. Mr. Trefz also is a contributor of many service articles to technical and trade magazines, and was the organizer of one of this country's first large automotive engine rebuilding shops.

Automotive Maintenance

Show March 28-31

New York's second annual Metropolitan Automotive Maintenance Show gives promise of being bigger and better than the first show which was held last April in Commerce Hall of Port Authority Building. At the initial drawing for space which was held on Feb. 14 approximately 50 manufacturers drew for more than 100 exhibit spaces representing something in excess of 10,000 sq. ft. As was the case last year the exhibition, which is essentially a working demonstration of modern garage and service station equipment, tools, accessories and parts, is sponsored by the leading wholesalers in the area.

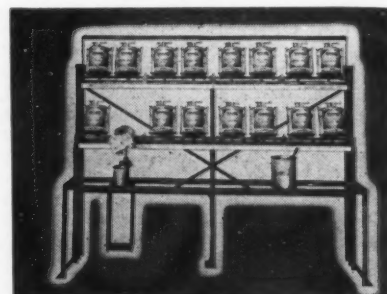
Chrysler Clarifies New Dealer Contract

Officials of the Chrysler Corp., announced this week that new "liberalized-sales agreements" are being offered to the entire domestic distributor and dealer organization representing all divisions of the corporation.

"The new agreement," according to a spokesman for the corporation, "substitutes a clear, easily understood document embodying the principles that have always guided the corporation in its relationships with its distributing organization and the public for the former legalistic document which frequently left a doubt in

Paint Mixing Machine

The Arco Company, 7301 Bessemer Avenue, Cleveland, Ohio, exhibited at the recent ASI Show a new color mixing machine. It is said to enable the



shop to mix any refinish color at an instant's notice and in any desired quantity. Its use eliminates the delays incident to waiting for unusual colors, and since only the desired quantity is mixed at one time, it eliminates waste.

Allez! Oop!

Although American engineers, methods, and equipment today are used throughout the world in drilling for and producing oil, Chinese are believed to have been the first oil men. Records indicate that centuries before the Christian era the Chinese drilled with crude equipment not greatly unlike the "spring pole" apparatus which bored into many a Pennsylvania hillside.

Coolies, jumping from a platform to a board on the "spring pole," forced the "bit" into the ground deepening the hole with each impact. The deeper the hole, the more coolies required for jumping power!



"It's all right, officer, if there's a fire I'll be responsible!"

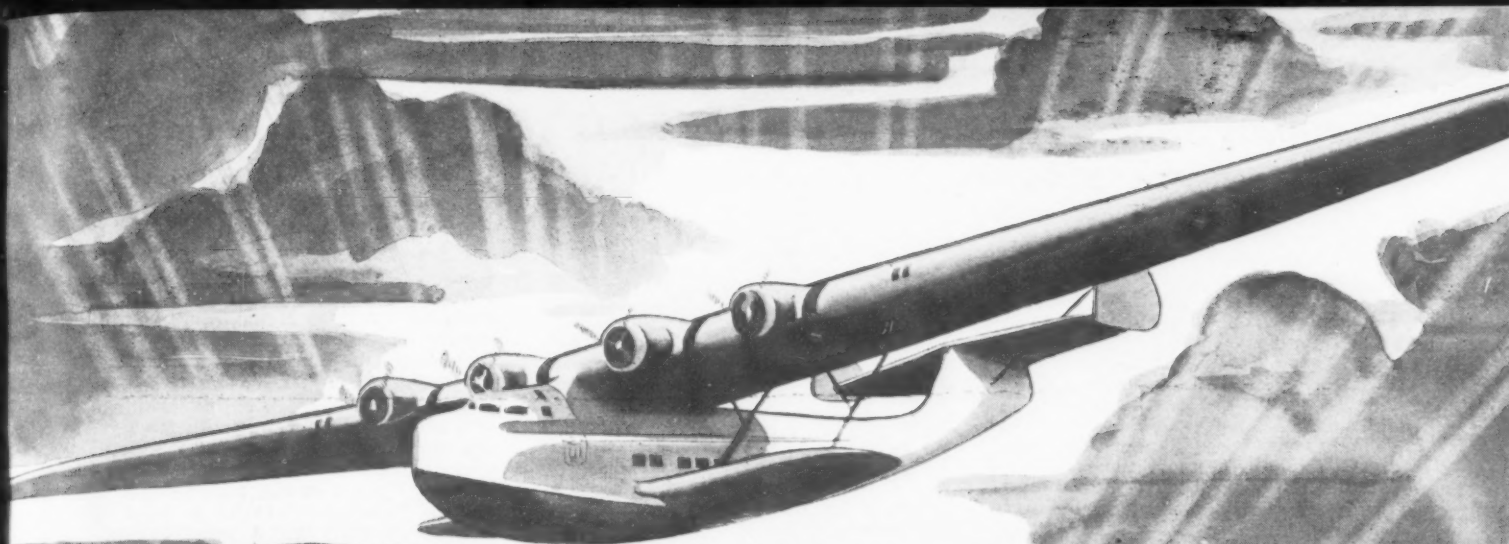
the minds of many Chrysler dealers.

"The new agreement sets forth not only our mutual obligations," he said, "but what all good dealers realize as their obligations to each other as responsible business men in their own communities. It is an attempt to write a fresh understanding between dealers and corporation regarding the basis on which they will do business together.

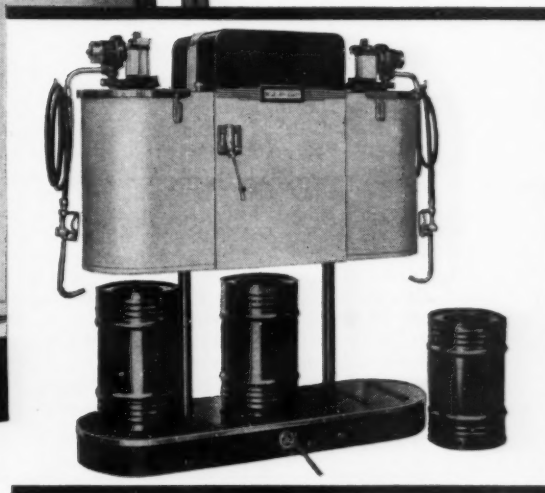
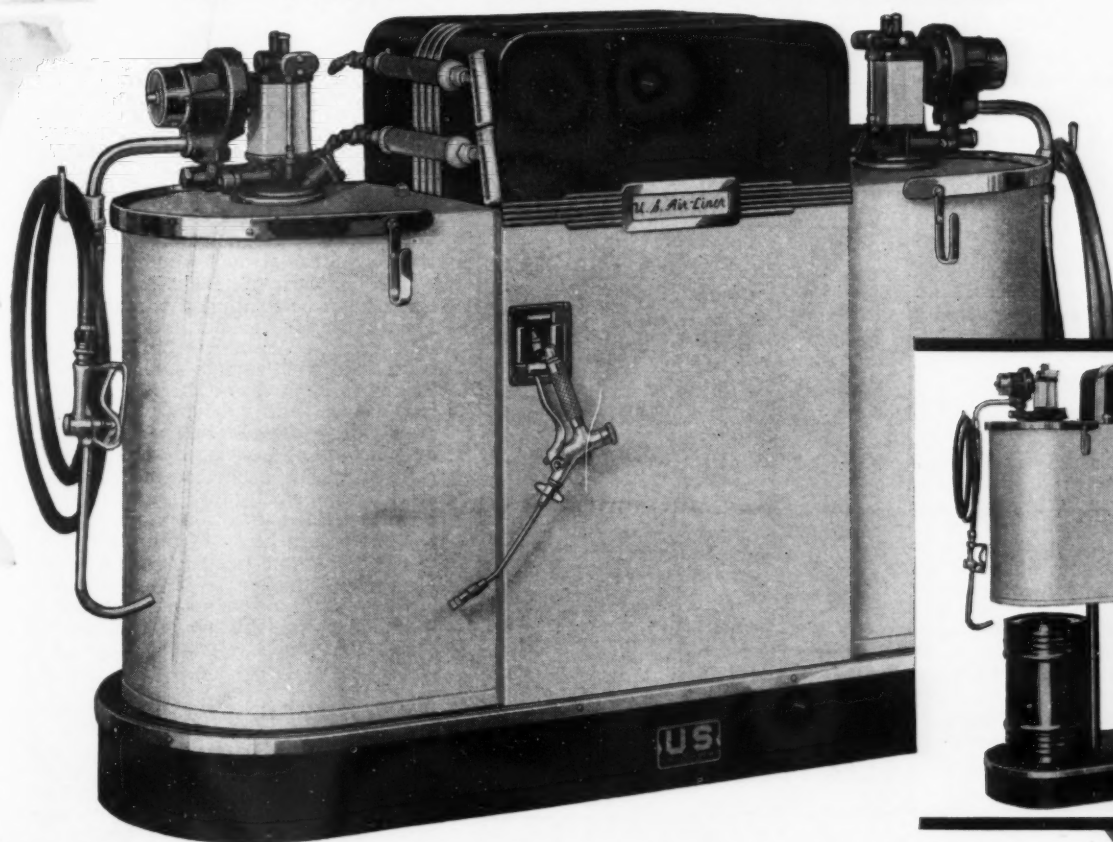
"It begins with an acknowledgment that the corporation and the distributor are dependent upon a continuing good will on the part of the public and that the success of each distributor is dependent upon the business conduct of all other distributors, particularly those in his immediate vicinity."

Policies and principles affecting orders for vehicles, parts and accessories, price protection, termination by either party, protection against cross-selling and bootlegging, changes in price, and other conditions which may arise in factory-dealer relationships are now clearly stated in the agreement in the belief that dealers will thereby know at all times what their obligations and rights are.

"For example," the spokesman pointed out, "it always has been our policy to ship cars and parts only on order from the dealer but now the new agreement expressly states that that is what we will do. Similarly the agreement now states specifically how every relationship between the corporation and its dealers will be handled.



U. S. AIR LINER



U. S. Air Liner has that "individuality" which not only attracts and sells a customer but renders a lubrication job never before equalled by any other piece of lubricating equipment. It really does a masterful job of lubricating as well as a thorough job of selling. ♦ It has beauty combined with "mechanical brains" because it operates entirely by air and the operator's work consists mostly of "finger work" on the controls. Mechanically you can forget there is any mechanism because the remarkable new U. S. (patent applied for) pump is absolutely "trouble-free" and actually improves with use. ♦ Changing grease drums is a fast, easy and simple operation. You merely insert air hose in the base and up pops the entire cabinet and remains elevated while changing grease drums. This is a Special Patented U. S. Feature. ♦ Like all great performers, the U. S. Air Liner has beauty . . . speed . . . practicability . . . durability and a "built-in goodness" that goes deep down under. Moderately priced.

THE UNITED STATES AIR COMPRESSOR CO.

CAR WASHING SYSTEMS
AIR COMPRESSORS

CLEVELAND, OHIO, U. S. A.
AIR TOWERS

GREASING EQUIPMENT
HYDRAULIC LIFTS

National Show Date Set for November 11

Change Made After Review of Sales and Labor Factors

After a careful review of the sales and labor factors involved, directors of the Automobile Manufacturers Association voted to defer the National Automobile Show from October to November, with the opening on Armistice Day, Friday, Nov. 11, matching the same day of the highly successful 1936 affair at Grand Central Palace, New York, instead of the October 27 date of last fall.

"Manufacturers advanced the date of the annual automobile show to the fall on the request of President Roosevelt after the industry had made its study of unemployment with a view to improving continuity of employment and annual earnings of its workers," reported Byron C. Foy, chairman of the show committee.

"Dealers have expressed varying

opinions as to the proper time for shows, ranging from Sept. 1 to Jan. 15, but with all agreed that the show and the new model announcements should be coincidental and this could be assured only by the Nov. 11 opening at Grand Central Palace, which at the same time would give consideration to the stabilization program for factory workers."

As many of the truck companies have been unable to properly canvass the proposals for a truck show, the manufacturers in the AMA voted against the promotion of a national truck show this year.

It is recommended that the show committee make a survey and report before Oct. 1 whether the association should promote a national truck show in New York in 1939.

Scientists Predict New Auto Safety Devices

Elimination of the dangers of the "hazard zone" of motoring, and the use of photo-electric cells, infra-red lights and short-wave radios, are some of the coming changes that will remove the causes of many auto accidents, predicted Professor John M. Lessells of Massachusetts Institute of Technology, and Dr. Miller McClintock, director of Harvard University Bureau for Street Traffic Research, outlining a program for "tomorrow."

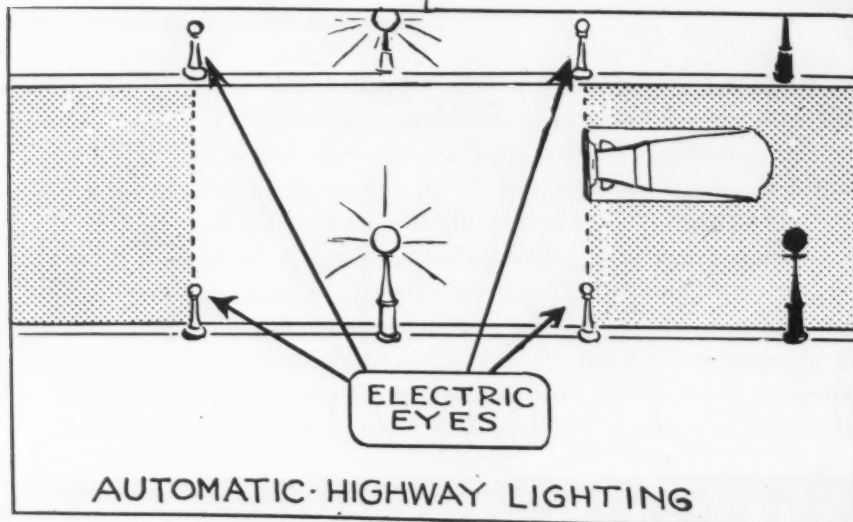
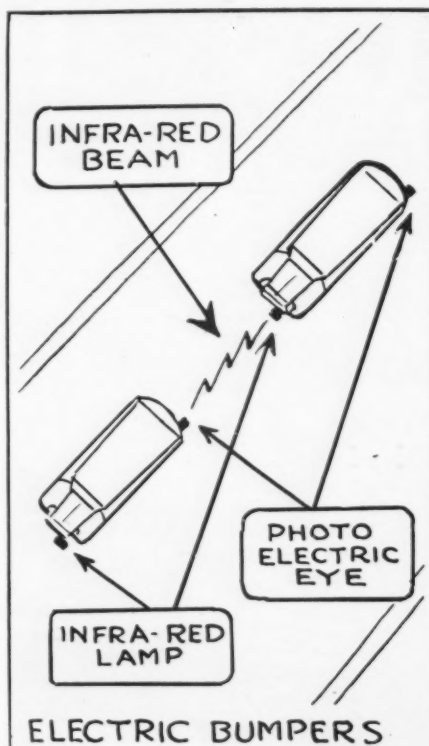
Among the magical changes listed for tomorrow's motoring are:

Automatic channelizers, or electric cables in the pavement to operate radio controls and steer a car safely around dangerous curves and obstructions on the highways.

Installation of infra-red lights in rear of autos to reduce the speed of approaching cars by actuating photo-electric cells which would automatically apply brakes and prevent collisions in lines of traffic.

Use of two-way radio control by all cars to automatically give warning signals to a driver when an unseen car is about to cross his path.

Control of highway lighting by infra-red beams and photo-electric cells so that an automobile will automatically light only the road section it is using.



"Phantom Corsair"

Presents Streamlined

Appearance

First public showing of the ultra-streamlined front drive "Phantom Corsair," new six-passenger coupe designed by Rust Heinz, young automotive engineer of Pasadena, Cal., was staged in Los Angeles. The car is illustrated on the cover.

The car incorporates novel ideas in design, construction, materials and features which contribute to safety, speed, beauty and convenience. It has been two years in the making and it will be produced for the present in limited quantity on a semi custom-built basis. The 288 cu. in. engine develops 190 h.p.

With an over-all height of but 57 inches, the car is unusually low, having a floor height off pavement of 14½ inches. It is streamlined throughout, underneath as well as above. There are no fenders or running boards, the body of the car covering all wheels, with easily removable wheel house covers. To provide more head room for entering and leaving, upper doors have been set in the top, these doors opening and closing simultaneously with the conventional doors by means of a simple automatic device. Electric push buttons replace the conventional door handles.

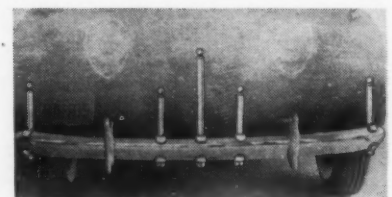
Two layers of cork and rubber latex have been applied to the entire body of the car to eliminate vibration and rumble, while the interior has been lined with sponge rubber to minimize injury in case of accident. Seats, too, are of solid rubber, four passengers riding abreast in the front seat and two on the enclosed rumble seat.

The car has a chrome molybdenum steel frame, with upper frame of electrically-welded aviation steel tubing, the outer skin being of alloy steel.

The "Phantom Corsair" has a wheel base of 125 inches. Width of the car is 76½ inches, the front seat being 67½ inches in length and the rumble seat 45½ inches.

Post Guards Protect Grille and Fenders

A new series of grille and fender guards in post design has been announced by Pick Mfg. Co., West Bend, Wis., makers of bumper, fender and body guards. The new post-guards



are available in two types, the fender guards which are 12 in. high, and the grille guards which are 18 in. high. Both types are made in three diameters, ⅝ in., ¾ in., and ⅞ in. They can be used in combination sets of three, five and eight or ten guards to afford complete protection front and back.

April to be Busy Foreign Race Month

While Europeans rest from racing competition during March, they will renew the season's campaign, which opened in January in the usual early start, on April 2 in England.

The Britishers, holding the spotlight in the six events scheduled on the International Calendar for April, will offer the annual Coronation Trophy race for the opening. The event is under jurisdiction of the British Road Racing Club.

On the day following, April 3, Italian drivers will start from Brescia, Italy, in the annual 1,000-mile tour event for sports motorists.

The spotlight will return to England on April 9 with running of the annual British Empire Trophy race.

The next day, April 10, the French will see the Grand Prix of the City of Pau.

England will hold its third event of the month on April 18, when the Easter Monday sports race is held on the famous Brooklands track. The month's schedule will wind up in Ireland on April 23 with the Cork International Car race at Dublin.

The first event to be run under the new International Formula of rules will take place May 8 in France with the Grand Prix of the Automobile Club of Tunis.

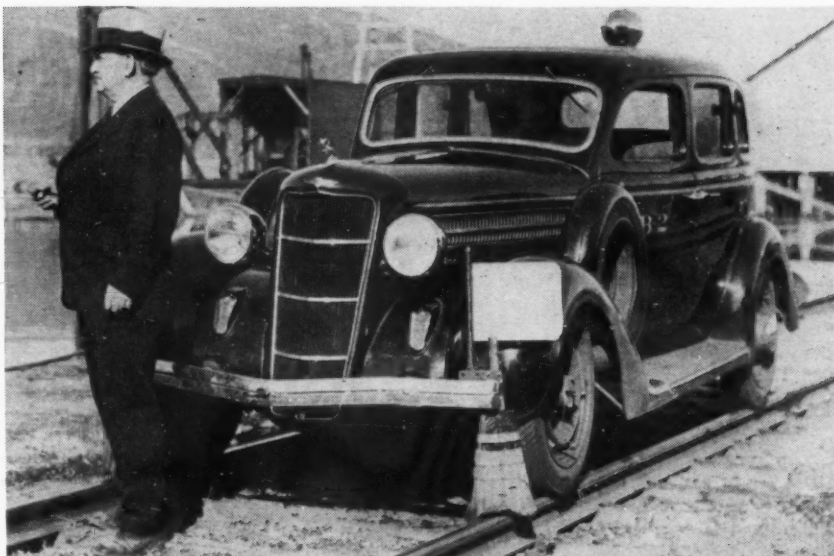
Pressure-Type Oil Lubricator

The American Chain & Cable Co., Inc., York, Pa., announces four gun-type Acco-Morrow pressure lubricators supplying oil of any type, even semi-liquid lubricants, under pressure of over 1000 lb., and six other type models supplying pressure over 500 lb. A slow, even pressure on the plunger at one end of the lubricator builds up pressure and forces oil



through the spout and out of the "Oilingseal" tip. This tip is made of a special oil-resisting compressible composition which makes a tight contact with oil holes or fittings in general use, so that no oil is wasted. The pressure insures that new oil is forced into the bearing, replacing old oil.

MOTOR AGE, March, 1938



Private Car of Colonel Otto Ohlson, general manager of the Alaska Railroad which runs 470 miles from Seward to Fairbanks. The sedan runs on regular tires, is held to the tracks by flanges bolted to the inside of the wheels. It travels much faster than the trains.

General Motors January Car Sales Show Drop

January sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 94,267, compared with 103,668 in January a year ago.

Sales of General Motors cars to consumers in the United States totaled 63,069 in January, compared with 92,998 in January a year ago.

Sales in December were 89,682 units.

In comparing this year's figures with those of a year ago, it should be borne in mind that in January and February, 1937, the sales did not fully reflect the consumer demand because of the stoppage of production and the shortage of cars in the field resulting from the strike.

SALES TO CONSUMERS IN UNITED STATES

	1938	1937	1936	1935
January	63,069	92,998	102,034	54,105
February	51,600	96,134	77,297
March	196,095	181,782	126,691
April	198,146	200,117	143,909
May	178,521	194,628	109,051
June	153,866	189,756	137,782
July	163,818	163,459	108,645
August	156,322	133,804	127,346
September	88,564	85,201	66,547
October	107,216	44,274	68,566
November	117,387	155,552	136,859
December	89,682	173,472	122,198
Total	1,594,215	1,720,213	1,278,996



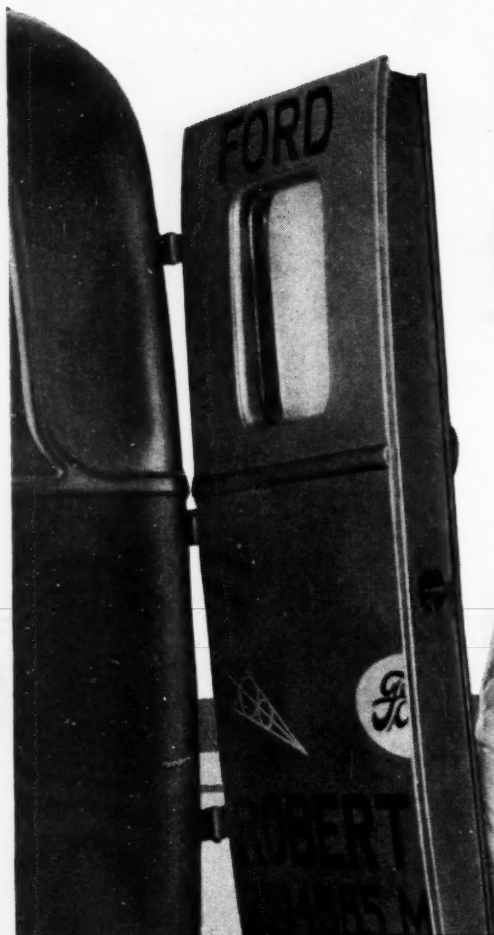
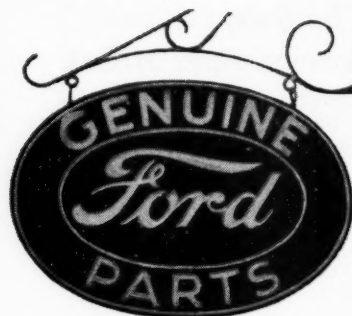
"Our car broke down and we hadda take this bum for a ride!"

BBK:uo

It all adds up to

MORE

PROFITS FOR YOU



More Work
Better Work
Faster Work
More Satisfied Customers
Prompt Deliveries
Exchange Items
Service Instruction
Merchandising Assistance

Total

MORE PROFITS



It's a matter of simple arithmetic! Give your customers the kind of service they want—good workmanship plus quality parts plus economical prices—and the result is more business and more profits for you.

That's why we say it will pay you to use and sell Genuine Ford Parts.

With them, you'll ADD to the quality of your work. You'll MULTIPLY your profits. You'll get a larger DIVISION of the huge Ford market. And you'll SUBTRACT from the amount of time required for each job because Genuine Ford Parts fit properly and you can get them delivered promptly to your door.

Figure it out for yourself! Then call the authorized distributor of Genuine Ford Parts in your territory today.

FORD MOTOR COMPANY
DEARBORN, MICHIGAN

GENUINE FORD PARTS

GENUINE



No. 3 BRAKE FLUID

One Type **MEETS ALL**
REQUIREMENTS . . .

Passenger cars, trucks, lifts and all hydraulic equipment, including heavy duty, can be properly serviced by this one grade of Whiz No. 3 Non-Evaporating Brake Fluid.

New State inspection laws boost sale of No. 3. With the Whiz No. 3 Non-Evaporating Brake Fluid in the system, car-owners can be absolutely confident that their car will not be rejected because of slow brake pedal return or sticking, a condition frequently encountered in systems containing alcohol type brake fluids when alcohol has evaporated.

CHECK THESE ADVANTAGES

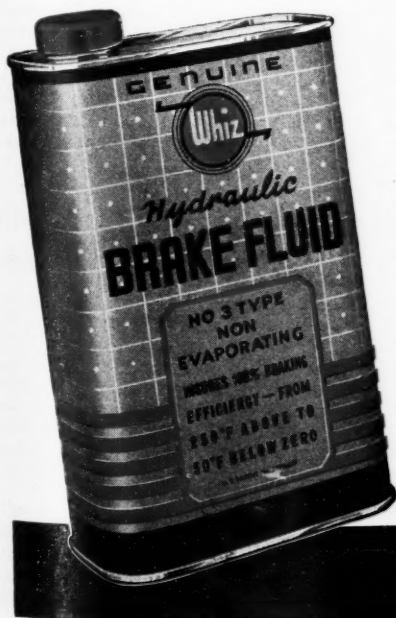
- ✓ It is a permanent fluid that will not evaporate, as it does not contain alcohol, water or volatile solvents.
- ✓ Free from acids and alkalis, it will not corrode or pit metals, swell rubber or harm system.
- ✓ It has a cold test of 50° below, insuring winter efficiency.
- ✓ Boiling point of 250° above, insures efficiency under intense heat.
- ✓ It will not gum or clog system.
- ✓ Its 100% lubricating properties prevent friction and wear.
- ✓ One grade services all types of hydraulic brakes, lifts, etc.
- ✓ It mixes with brake fluids recommended by car manufacturers.
- ✓ Its high flash point minimizes danger of ignition by friction.

Write for details of the Whiz Brake Station Merchandising Plan

\$1000.00

reward is offered to dealers in connection with Brake Fluid comparison test. Write for complete details and entry blank.

R. M. HOLLINGSHEAD CORP., CAMDEN, N. J., U. S. A.



WHIZ NO. 3 NON-EVAPORATING HYDRAULIC BRAKE FLUID IS FULLY PROTECTED BY U. S. PATENT NO. 1,779,460 AND INFRINGEMENTS WILL BE VIGOROUSLY PROSECUTED

AAA Conducts American Hammered Ring Test

Official driving tests, covering a total mileage equivalent to seven-eighths of the distance around the world, in order to test the oil conserving ability of its new flexible Oil Cutter piston ring in competition with other makes are described in a 24-page booklet just published by Koppers Company's American Hammered Piston Ring Division here.

These were the first competitive tests on piston rings ever conducted by the American Automobile Association contest board. Official AAA drivers in 1935 Ford, Chevrolet and Plymouth stock cars, purchased by the contest board, were driven a total of 21,000 miles on Roosevelt Raceway, Long Island. Four makes of piston rings from dealers' stocks were used in the cars to test their ability in controlling oil consumption.

Tumbler Appoints Steine

Mr. J. A. Tumbler of the Tumbler Laboratories in Baltimore, Md., has announced the appointment of Mr. George J. Steine as director of sales. Mr. Steine has had a background of a great many years in the automotive replacement market and in his last connection served as a divisional sales manager in the Detroit territory.



G. J. Steine

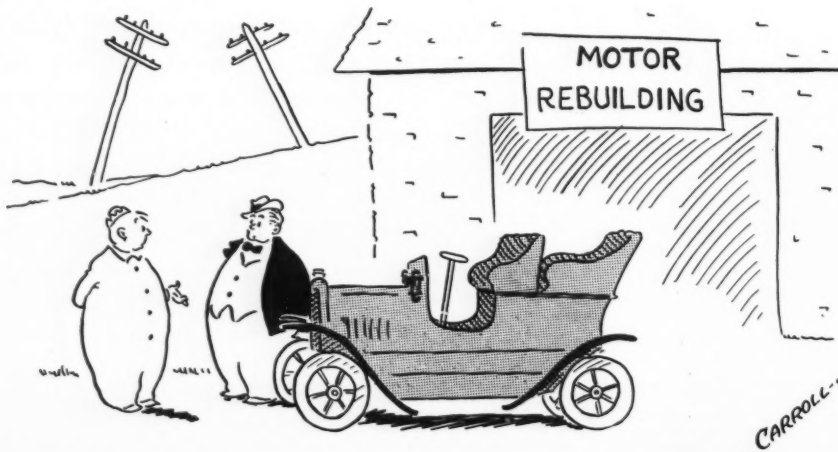
Production Still Paced by Orders

Car and truck manufacturers began February as they ended January with production realistically determined by orders received from their dealer organizations. With schedules almost universally established on a week-to-week basis there are few who will venture an estimate on what this month's total production will be.

Consensus of opinion, based on the present operating schedules, is that the industry will finish the month with about 200,000 new cars and trucks coming off the lines.

Factories and their entire distrib-

uting organizations are leaving no stone unturned in their attack on used car inventories. Although reports from the field are mixed there is evidence that continued selling effort combined with bargain prices is beginning to produce results. All factories have developed special used car merchandising programs to help their dealers, while dealers in turn, through their associations and individually, are emphasizing the unusual values now available. Newspapers in many sections of the country are playing an important part.



"Well, I wouldn't guarantee that you'll get tickets for speeding!"

MEMA Index Shows Business Decline

(January, 1925, equals 100)	Dec. 1937	Nov. 1937	Dec. 1936
Original Equipment Shipments to Vehicle Mfrs.....	114	174	198
Service Parts Shipments to Wholesalers.....	98	121	113
Accessories Shipments to Wholesalers.....	126	136	83
Service Equipment Shipments to Wholesalers.....	81	110	91
GRAND INDEX (Composite) of above divisions....	119	156	164
Index Car and Truck Production.....	144	157	216
Index General Business (Bank Transactions).....	81	69	99

Large Used Car Market In Farm Families

Summary tabulations of 17,000 farm families in 64 counties made in 1935-36 by the Bureau of Home Economics, U. S. Department of Agriculture, under the direction of Dr. Louise Stanley, show that farm families on the average buy almost twice as many used cars as new cars. Usually these are high-value used cars, although their cost averages only a little over one-third the cost of the new cars purchased.

Car ownership of all non-relief, native white farm families interviewed ranged as high as 97 per cent in California, North Dakota, and Kansas. In Vermont the percentage was 73. Car ownership the country over averaged a little more than 82 per cent.

Only in California did the white farm families studied purchase more new than used cars. In the group surveyed, an average of \$263 was paid for used cars and \$739 for new cars.

Ford Wins Monte Carlo Rally

Competing against the cream of Europe's finest motor cars, a Ford V-8 piloted by Bakker Schut triumphed for a second time by winning the 1938 running of the annual Monte Carlo rally.

In addition to winning the rally, five Fords and Matford cars (the latter Fords manufactured in France) were among the first seven cars to win places in the rally. A Matford team won the cup for best team performance, while Madame Rouault, piloting a Matford, was winner of the ladies' cup. Fourteen Ford V-8 cars and the entire Matford team of five cars completed the rally course of some 4000 miles. All of the winning Fords were powered with 85 hp. V-8 engines.

The competitors in the rally piloted their cars over strenuous routes which originated in seven corners of Europe and converged upon Monte Carlo. The rally routes originated at John O'Groats, at the northern tip of Scotland; Stavanger, Norway, and Umea, Sweden; Tallinn, Estonia; Athens, Greece; Bucharest, Roumania, and Palermo, Sicily.

The Form-A-Gasket Manual

Milt Marion, well known race driver who drove the Form-A-Gasket test car in the last Daytona Beach 250-mile stock car race and won, has written a very interesting story of his experiences.

The booklet is profusely illustrated and contains many pictures showing important uses of Permatex Form-A-Gasket.

Copies will be sent free by writing for the Form-A-Gasket Manual to Permatex Company, Sheepshead Bay, N. Y.

New Location for Motorola Chicago Distributor

Mr. D. M. Lucas, General Manager of Jackson Distributing Company, Chicago distributor of Motorola Car and Home Radio, announces the removal of their offices, display rooms and warehouse to a new building located at 1330-1332 West Washington Boulevard, Chicago. Jackson's telephone number remains unchanged—Monroe 4312.

Jackson Distributing Company will occupy an entirely new building which is planned along the lines of the new Motorola factory—a white and blue tile exterior of modern streamlined design.

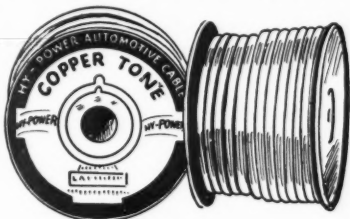
Save the Old Plates

Michale Spitzer, who runs "Spitzer's Garage" at Monhagen Avenue Extension, Middletown, N. Y., must be a handy sort of fellow to have around the house. He's figured out a use for old license plates that may be of interest to the rest of you repair men.

Figuring that they cost too much to throw away, Mr. Spitzer thought hard to find something that might be done with last year's license plates instead of tossing them into the nearest waste can. He hit upon the idea of clipping them a little and folding them a little—and suddenly he had a very neat looking little metal tray. Mr. Spitzer has made trays out of every old tag he could lay his hands on and has found a hundred and one uses for them around his garage. They come in mighty handy, he says, for holding small parts, bolts, nuts, papers, etc.

Lion Cable Sets

The latest products of the Lion Auto Parts & Mfg. Co., 1920 South Michigan Avenue, Chicago, Ill., are the new "Copper Tone" DeLux ignition cable sets and "Copper Tone" DeLux cable on 100 ft. metal spools. This



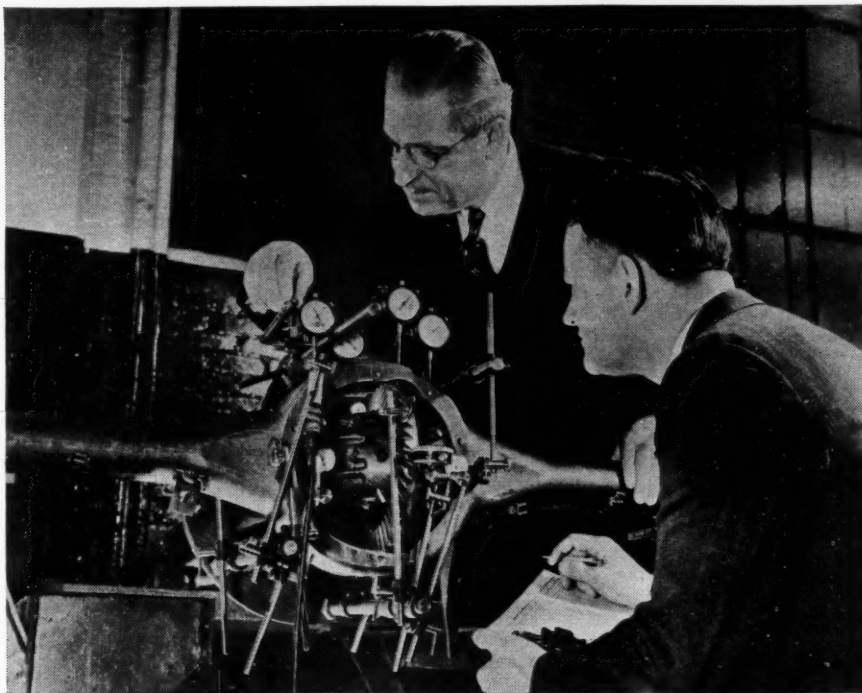
cable is said to be entirely new in construction and appearance, and new in sales appeal. It is claimed to be heat proof, oil proof, weather proof and corona proof.

Crusade Against Unsafe Brakes Boosts Sales

A unique advertising and sales promotion campaign is being conducted by the Triplewear Brake Linings Corp. in the form of a nation-wide crusade against unsafe brakes. Public interest in this subject is aroused through the medium of an ingenious little "vest pocket" safety gage that enables the motorist to determine whether his brakes operate within the safe stopping distance laws now in force in many states. The test range covers all speeds between 20 and 70 miles an hour.

The brake station secures these gages from the Triplewear Corp., with the option of selling them to its customers and prospects for a small nominal sum or distributing them gratis. As the gage is imprinted with the name of the brake station, the motorist making the test naturally goes back to that station for a check-up on results.

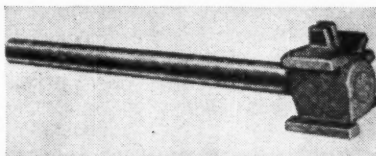
Brake stations entering this campaign secure local publicity through a cooperative newspaper advertising campaign that ties up with their jobbers. The Triplewear Corp. furnishes its brake stations with ready-made newspaper advertisements, form letters and other consumer literature at no cost.



Gages tell what happens in axle under load—by means of this unique test on a passenger car rear axle, set up in the laboratory of the Chevrolet gear and axle plant in Detroit, twelve gages measure every possible deflection assumed by the parts in the rear axle under a given load condition. A weight is hung on the end of the driveshaft that corresponds to a maximum load on the axle during actual driving conditions. All movements or deflections of the driveshaft, pinion and ring gears, and axle shafts are then read simultaneously. Such minute and constant checking results in better mounting of bearings that serves to prolong axle life and insure more satisfactory service. In this picture are Leo B. Olick (left) and Jack Kelly.

Drum Plug Wrench

The Morse Mfg. Co., Inc., 400 South Franklin St., Syracuse, N. Y., has developed a new wrench for removing or tightening all sizes of plugs or bungs from steel drums. It is shaped

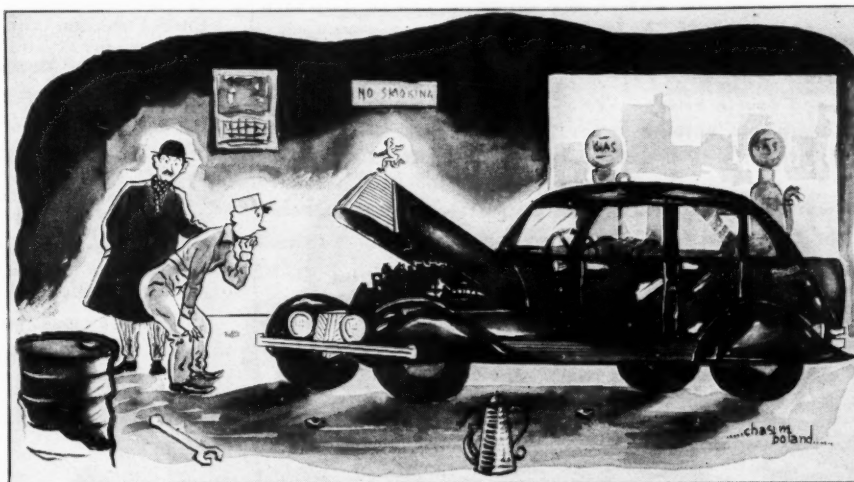


for 10 different applications. Sturdily built and equipped with strong round metal handle. List price \$1.25.

Lisle Reamer

Price Reduction

The Lisle Corporation, Clarinda, Iowa, has just announced that the price of their Superange ridge reamer has been reduced from \$15.00 to \$12.50. In conjunction with the reduced price, Lisle also announces several new improvements on the Superange model. A new adjustable bracket is said to make the reamer instantly adaptable to all cylinder blocks. This is accomplished by the use of movable shoes at each end of the bracket, which may be turned in any direction to avoid studs or bridge adjacent cylinders.



"I wish you'd look her over, she's been snapping at traffic cops!"

Fuel Blends

(Continued from page 21)

METHANOL OR METHYL ALCOHOL has special utility because of its extremely high antiknock and latent heat values. Its calorific value is low but a small percentage added to a fuel mix will materially increase the latent heat value of the blend, thus noticeably improving power and acceleration. In road racing where considerable deceleration must be met care must be exercised in its use as an excess may cause the engine to load up at low speeds and interfere with acceleration.

ETHYL ALCOHOL finds use where for some reason methanol is unsuitable. Its tendency to absorb water is greater than that of methanol, making it less desirable. Its latent heat value is considerably less, calorific value better and antiknock rating about equal to that of methanol.

ACETONE C. P. Little information is available concerning this material for fuel blending. Because of its low boiling point, high latent heat but poor calorific value small percentages should influence blends appreciably. Its most important use appears to be its value in stabilizing fuel mixtures.

TETRAETHYL LEAD is the most widely used material for improving the antiknock value of fuels. For racing purposes it has been used in concentrations of two to more than 40 ccs. It is useful also in reducing the effect of high combustion temperatures on

SUGGESTED FUEL BLENDS						
Formula	Fuel Blend	Specific Gravity 60 F.	Calorific Value Average BTU/Gal.	Latent Heat Average BTU/Lb.	Approximate Average Boiling Point Deg. F.	Approximate Jet Area % to Gasoline
A	95-95% Cal. Aviation (104-176) 5-15% Benzol (90) Tetraethyl lead 6+ ccs.	0.699 to 0.718	113488 to 115047	136 to 139	144 to 151	99.5 to 98.5
B	80% Cal. Aviation (122-302) 20% Benzol (90) Tetraethyl lead 6+ ccs.	0.768	118269	140	212	98.0
C	70% Cal. Aviation (104-176) 10% Natural Gasoline 20% Benzol Tetraethyl lead as required	0.725	115564	143	151	98.5
D	40% Cal. Aviation (104-176) 40% Methanol 20% Benzol Tetraethyl lead as required	0.770	94476	257	158	136.0
E	10% Cal. Aviation (104-176) 10% Benzol 80% Methanol Tetraethyl lead as required	0.798	71833	414	153	161.0
F	10% Natural Gasoline 10% Benzol 80% Methanol Tetraethyl lead as required	0.775	71106	432	130	157.5

various parts of the engine.

ETHYL ETHER is an extremely volatile material about which there is little authentic data as a blending material except its negative octane rating.

The characteristics of gasoline and benzol are well known. The alcohols have the advantage of extremely high antiknock value, permitting compression ratios in the region of 12 to 1.

Their calorific value is low so that fuel consumption on a volume basis is high but extremely high latent heat gives a substantial increase in horsepower at a given compression ratio. Methanol has some advantages in power development but under some conditions tends to preignite and then should be replaced by ethyl alcohol.

In long distance speedway and road racing the completed fuel must have a

\$5,000 IN CASH

"WHY GREY-ROCK IS THE F

PRIZES

FIRST PRIZE \$1,000.00 CASH

SECOND PRIZE 500.00 CASH

Third and Fourth Prizes \$100.00 Cash Each

Fifth, Sixth and Seventh Prizes 50.00 Cash Each

Eighth, Ninth, Tenth and Eleventh Prizes 25.00 Cash Each

Next 75 Prizes

New Alden-Cowdrey Brakeometers (Value \$12.50 Each)

Next 50 Prizes—\$5.00 Cash Each

. . . and an Acknowledgment Prize to All Other Entries . . .

YOU CAN'T LOSE—NOTHING TO BUY—NO BOX TOPS

JUST WRITE
50 WORDS



READ THESE EASY RULES

1. Contest open in United States and Canada only to the Proprietors, Foremen and Mechanics in garages, repair shops, service stations, brake shops and car dealer establishments, and also the Foremen and Mechanics in fleet operators' shops.

2. In fifty words or less tell "why Grey-Rock is the Fastest-Growing Line."

3. Write clearly on any white paper or ask your Grey-Rock jobber for official entry blank with suggestions for winning. Judges will not be influenced by grammar, spelling, penmanship or fancy entries. It's what you say that counts.

4. Be sure to give your own name, your company's name and the address of the place you work. Also give your Grey-Rock jobber's name and the name of his salesman who calls on you.

5. Contest closes midnight, June 15, 1938.

6. Duplicate prizes will be awarded in case of a tie. Judges' decision is final. All entries become Grey-Rock property.

Grey-Rock

volatility range exactly suited to the engine under the conditions encountered so that loading up on the turns will not occur and there will be no tendency to foul spark plugs nor interfere in any other manner with the most efficient operation of the engine.

The latent heat value or loss of heat which occurs in changing a liquid to a gas should be the highest possible for the completed fuel as on this depends the amount of the charge weight and the value of the boost temperature. The higher the latent heat value the better chance there is for insuring the maximum weight of fuel mixture being taken into the cylinder per stroke and thus developing maximum power.

The calorific or heat value of the completed fuel must be as high as possible since this influences maximum power and produces the best specific fuel economy.

The antiknock value of the completed blend should be sufficiently high to insure complete freedom from detonation under all conditions encountered. Otherwise loss of power, high engine temperatures and destructive effects on spark plugs, valves, pistons and other engine parts may occur. Tetraethyl lead should be used both for improving the octane rating of the blend and for its cooling effect.

In blending special fuels for racing purposes it is extremely important to bear in mind that the air-fuel ratio must be maintained somewhat on the rich side in order to avoid the possibility of preignition and heating. It is important also to understand that

while high volumetric compression ratios somewhat increase volatility and thus may favor blends with high calorific value, supercharging tends to reduce volatility and increase the charge density. Therefore with a high degree of boost very volatile fuels are desirable.

In long races fuel consumption may influence the number of necessary pit stops. For non-supercharged engines, with compression ratios in the region of 10 or more to 1 formula A or B presents a basis from which to start. Either should give good power but B should have the better fuel economy. Substituting 10 per cent natural gasoline for some of the aviation should improve distribution and engine activity. For the supercharged engine

formula C or D should be better starting points. D particularly should give high power output with fair fuel economy.

If fuel consumption is relatively unimportant formulae E and F have excellent possibilities when superchargers are used. Both should produce high power and excellent acceleration because of high octane number, fine volatility and unusually high latent heat. If spark plug loading is experienced during deceleration or on the turns one-half to all the methanol may be replaced with ethyl alcohol or some other adjustment of the formula made. Replacing some of the methanol with a very little acetone, say 1 to 5 per cent, may be worth trying.

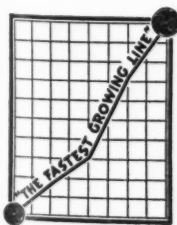
With suitable adjustment of the air-fuel ratio and sufficient lead to provide adequate antiknock rating these formulae should not give serious difficulty from loading nor heating but if this occurs they can be readily adjusted for eliminating it, without seriously affecting other characteristics.

The foregoing is offered with the purpose of supplying information which may not be available readily to many interested. The several fuel blends are presented to afford the basis for fuel research with the engine concerned and not in any sense as specific recommendations for completed blends. It is hoped that these data may prove of service to those interested in the evolution of a blend best suited for the development of maximum power and acceleration in their engines.



"My son Elmer was in the city once and got the idea!"

HAND PRIZES TELL US E FASTEST-GROWING LINE"



Grey-Rock is the fastest-growing line. You servicemen have found it so much easier to use, so much more satisfactory to motorists, so much more profitable to yourselves, that you've made it spurt ahead.

Now tell us why. Tell us how Grey-Rock takes the guesswork out of what lining to use. How these boxed sets save waste pieces and heavy inventory. Tell us how Grey-Rock's simple instructions make every brake easy to service, every car easy to trouble-shoot. Tell us why you like Grey-Rock's complete point-of-sale advertising. Tell us,

above all, the satisfaction your motorists get from quick, quiet, smooth stops with longer wear and few adjustments. Tell us how you no longer just "service" brakes—you balance them.

Tell us what's behind all this—how Grey-Rock has vast experience in new-car brake designing and its company's products on 9 out of 10 cars. How the newest developments go immediately into Balanced Braksets. How you can get a good price for a good job, with a good profit.

Remember, 50 words, real enthusiasm, a prize for everybody. Send your answer to Grey-Rock, Dept. M.A.M., Manheim, Pa.

UNITED STATES ASBESTOS DIVISION of Raybestos-Manhattan, Inc., MANHEIM, PA.
BRAKE LININGS • CLUTCH FACINGS • FAN BELTS • HOSE • PACKINGS • RELINING EQUIPMENT

BALANCED BRAKSETS

Ingersoll-Rand Bulletin

A new bulletin on small industrial compressors and vacuum pumps has been recently issued by Ingersoll-Rand Co., 11 Broadway, New York City.

The bulletin, number 2118, gives complete rating tables of more than 50 models in this classification, including their physical dimensions and shipping weights as well as their capacities, pressure, and rated horsepower.

Copies of the bulletin will be sent upon request.

Cleans Air Cleaner

Replacing the old hand-cleaning or bucket-bath method of cleaning the carburetor air cleaner, the Hawley Mfg. Co., Chester, Pa., has developed a new model of their Master Airstrainer Cleaner suitable for mounting on the bench. The new model supplements the larger, pedestal type, and carries a price of \$12.75 to the dealer.

The air cleaner is placed inside the



Master cleaner, which uses the reverse flush method of cleaning, thereby insuring that all parts of the copper wool and baffle plates are thoroughly cleaned. The Master Airstrainer Cleaner operates by air pressure, and the cleaning solution, usually kerosene, removes all foreign matter and abrasives quickly.



Trouble with the law was encountered by a gentleman pictured in February Motor Age, who covered the World's Fair "advertising" on his New York license plate. Thomas Page, above, avoided this difficulty and still made his point by adding a small plate saying, "Don't go."

Ethyl Motor Clinic

Inaugurated

Advice from E. W. Webb, president, Ethyl Gasoline Corporation, indicates that his organization inaugurated a new and interesting activity—the Ethyl Motor Clinic—on Feb. 2 at the Ethyl showroom, 3756 Woodward Avenue, Detroit. This clinic was demonstrated to a group of top executives representing the leading manufacturers in the automotive industry.

The clinic is a mobile proving ground, featuring a full-size electric chassis dynamometer with instrumentation for engine performance testing and tune-up. With this equipment, the operator can start with a new car with standard factory setting, then vary the spark setting and fuel to demonstrate the improved performance and fuel economy that is possible with the proper fuel and engine tune-up.

Following the initial demonstrations in Detroit, the clinic will go on tour to demonstrate the tune-up procedure to automobile dealers and oil company organizations. For the tour, Ethyl will have seven of the clinics en route at one time.

Television Success Dependent on Car Industry

One of the biggest problems facing television and its general use in the home can be solved, paradoxically, only by the automobile manufacturers. So the Radio Club of America was told at its meeting in New York City last week by A. F. Murray, engineer in charge of television research for Philco Radio and Television Corporation.

Murray explained that the television receiver operates on ultra-short waves, which are extremely sensitive to the running of an automobile motor.

The effect of a passing auto in the proximity of a television set is a blurring of the picture on the screen. The interference causes thousands of tiny white specks to make their appearance, producing the semblance of a raging snowstorm.

If there were an automobile parked nearby with motor running, television image-reception would be impossible, Murray declares. Television engineers, he says, have not found any means of coping with the situation up to the present.

Yet, he points out, there is a solution, but the television engineers will have to look to the automobile producers for it. When and if television becomes prevalent in the home, the use of suppressors on automobiles will effectively eliminate auto interference with television reception.

Only the car manufacturers themselves can equip every auto with suppressors. Will they do it? Murray thinks they will when the time comes. In the meantime, he declares, it places television in the position of being dependent for a good measure of its future success upon another, entirely unrelated industry.

Wright Gets

Navy Engine Order

A contract totaling \$1,008,217.40 for construction of 56 airplane engines and spare parts has been awarded by the Navy Department to the Wright Aeronautical Corp. of Paterson, N. J.

The engines, the Department said, are for the 21 two-engine flying boats now under construction in Baltimore at the Glenn L. Martin Co. plant.

Black and Decker Opens New Orleans Branch

The Black & Decker Mfg. Co., Towson, Md., announces the opening of a factory service branch at New Orleans, La. Located at 630 Baronne St., it is in a strategic position to give prompt and efficient service to Black & Decker users in the South. This is the 22nd factory service branch to be established by the company in the United States.

Establishing this branch is in line with the company's policy of training men from the ranks, at the Towson factory, to be qualified service engineers. This guarantees that all service in the field will conform exactly to factory standards.



"Let's stick around. This ought to be good!"

Selling with Stamps

(Continued from page 15)

that you'd like to have him as a customer will not bring that person rushing into your shop eager to stuff your cash register full of dollar bills. He may be satisfied with the work of the shop that is already enjoying his patronage; he may be taking all of his business to the dealer from whom he bought his car. He's not going to change his habits because you want his business. He won't change them until he wants to—and he won't want to until you give him some reason for the change.

However, it's not very difficult to find a reason for the customers to come to your shop instead of going to your competitor. You may not actually have equipment or services that are any different, yet a little showmanship in the direct mail letters will make your shop stand out above your competitors.

The addition of a new piece of equipment to your shop is one sufficient reason. It may be capitalized upon by pointing out what the new equipment means to the motorist in cutting down repair bills, speedier service, etc.

A special price on some accessory, service or group of services is always a good reason. Holidays, too, offer sufficient reason for urging the motorist to come to your shop in order to have his car prepared for any trip he may be contemplating. If your shop is located near stores or theaters, a good reason to offer is its convenience for quick service while the owner is attending a show or shopping.

In fact, almost any reason you can think of as to why you should have the business is a good reason for urging the car owner to patronize your shop. All that is needed is dramatization in the direct mail.

The reasons you stress should also be determined by the class of motorist to which your mailing is addressed. The passenger car owner who uses his car primarily for pleasure and convenience is, of course, interested in preventative maintenance to eliminate breakdowns and expensive repair bills. He is also interested in riding comfort, appearance, quietness, ease of handling, pick-up, speed and accessories. What you can do for him along any of these lines is a good basis for a series of letters.

If your letters are directed to the truck owner, however, emphasis on such points as riding comfort, quietness, etc., is likely to prove a waste of time, stationery and stamps. The truck owner is interested in preventative maintenance and his chief interest is in economy of operation. He doesn't care much if you tell him you can make his truck ride like a Pullman or step out at the traffic light ahead of everything else. But, if you can tell him how to cut down on gasoline and oil consumption and on replacement parts, you stand a good chance of getting his business.

The reasons given in your letters do not necessarily have to be your own reason for wanting a group of new customers. Perhaps, for instance, you're anxious to gather in more re-

bore jobs to give more work to idle equipment. A letter to a motorist in which you stress your facilities for such work may not have such good results. For one thing, a good many of the letters you send would go to persons not yet needing such work done on their cars. For another, many of the recipients of your letter wouldn't know the difference between reboring and a carburetor adjustment. However, by drawing new customers to your shop by offering, for example, a special short-time price for motor tune-up and lubrication, you gain an opportunity to inspect their cars. If cylinder reboring may be needed, there's the opportunity to sell it. No

matter what reason brings the motorist to your shop, once there he's a prospect for all your services and accessories.

Your letters must emphasize what your shop can do for the motorist if you expect them to pull customers into your shop. The person who receives the letters must be impressed with the fact that you are interested in his car—not just the amount of business you can get from him.

The success of your direct mail depends a lot on the letter itself, to whom it is sent and when it is sent. Future issues of MOTOR AGE will bring you more information on those subjects.



STRAIGHT LINE METHODS BRING FIRST LINE RESULTS

ASK any dealer about K-D and he'll tell you that K-D, its organization and products hew straight to the line . . . in every way. It's quality first—then quality and again quality.

Results tell the story . . . for K-D is first in prestige, in volume, in strength of the products featured.

Write for catalog and I.C.C. charts.



Model No. 855 Fog Lamp de Luxe

A beauty for looks . . . a bear for service. 7" special lens; pre-focused Mazda bulb; all-chromium body. Absolutely the finest fog lamp on the market—pierces fog, rain, snow, dust and sleet.

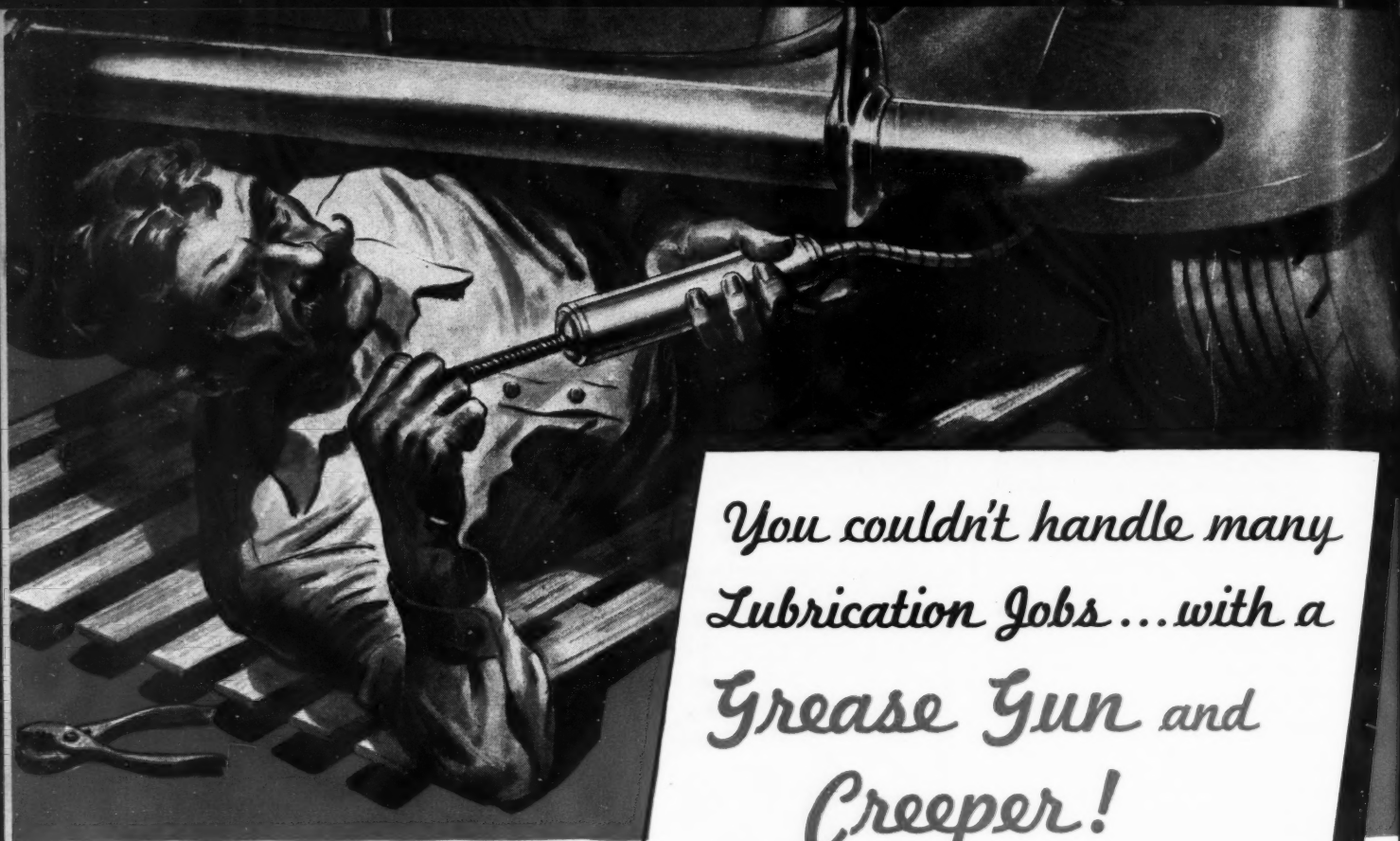
Model No. 604 Electric Flare

1938 streamline design. Fresnel type lens—same type as used in U. S. light-houses—body drawn in one piece. Moisture, dust and shock proof. Brilliant red light in all directions.



THE K-D LAMP CO.

CINCINNATI, OHIO



*You couldn't handle many
Lubrication Jobs...with a
Grease Gun and
Creeper!*

Why not sell **BRAKE SERVICE** *the Modern Way?*

Do you remember 'way back when they still had to "get out and get under" to reach 20 or 30 grease cups? All the equipment needed for a "grease job" was a can of grease, a hand gun and a pair of pliers.

Quite a contrast with today's complete, scientific lubrication equipment and variety of lubricants, each developed to do its particular job *best*—from fan bearing to hypoid rear end!

There's just as big a change in brake service. You can't expect to earn 1938 profits with 1915 methods and materials. And Raybestos, leader in brake lining developments for 31 years, now offers not only the most perfectly suited linings specially engineered for every car and truck, but a Complete Brake Service Department set-up (pictured at right) that sells *more* relining jobs and increases brake service profits 3 definite ways.

Ask your Raybestos distributor to show you this complete, colorful, brake department set-up, and explain why it pays best to LINE UP WITH RAYBESTOS.

RAYBESTOS DIVISION, Raybestos-Manhattan, Inc. Bridgeport, Conn.

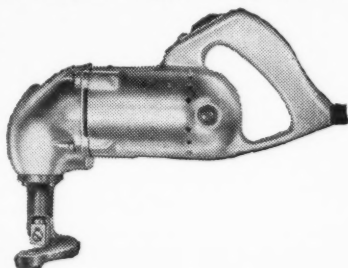


Raybestos

**COMPLETE
BRAKE SERVICE**

Lectro-Shear For Sheet Metal Cutting

One of the latest products of Black & Decker Mfg. Co., Towson, Md., is their Lectro-Shear for cutting 18 and 16 gage sheet metal. It is supplied with a universal motor operating from 110 volt A.C. or D.C. current, and has a thumb switch in the handle. The shearing action is accomplished by the rapid reciprocating action of



a vertical blade against a stationary horizontal blade, set in a special shoe which indicates the correct cutting angle and adapts the tool to all types of cutting work. The Lectro-Shear will cut all types of sheet metal, and will cut on a radius as small as $\frac{3}{4}$ in. Supplied in two sizes—for 18-gage work, priced at \$60.00, and for 16-gage work, priced at \$76.00.

GM Diesels

(Continued from page 17)

Cylinder heads also are in a single casting in all models, and contain the dual exhaust valves and the injector unit, the latter in the cylinder axis. Valves are operated through pushrods and rocker arms, from a camshaft located in the upper part of the cylinder block and driven by a train of gears which also drives the blower. It will be seen that the gears for the camshaft and blower drive are located at the flywheel end of the engine, where the crankshaft speed is most nearly uniform.

The blower, which is of the Roots type and has two three-lobed rotors, is flange-mounted on the side of the cylinder and discharges directly into an air box surrounding the cylinders. There are inlet ports in the cylinder wall and in the liner at the bottom end of the stroke, through which air from the air box enters the cylinder as the inlet port is uncovered by the piston. During the up-stroke the air is compressed in the cylinder in the ratio of 16:1. Fuel is injected into the combustion chamber by a combined pump and spray nozzle located between the exhaust valves in the cylinder head and operated from the camshaft through a tappet rod and rocker lever, the same as the exhaust valves.

The engine thus operates on the uniflow principle, air entering the cylinder through ports at the bottom and products of combustion escaping through valves in the cylinder head.

The crankshaft has main bearings of $3\frac{1}{2}$ in. diameter in all models of the 71 series, and all main bearings are of the same length, viz., $1\frac{1}{8}$ in. There are four main bearings in the three-cylinder model, five in the four-cylinder model, and seven in the six-cylinder model. Crankpins have a

diameter of $2\frac{3}{4}$ in., and the crankpin bearing is $1\frac{25}{32}$ in. long. All bearing bushings in all models are thus alike and interchangeable. This feature of interchangeability applies also to the piston, valve gear, connecting rod, pump, timing gears, flywheel housing and like parts.

A most interesting feature is that the entire cylinder block and blower assembly can be turned end for end without disturbing the flywheel or gear train, and thus place all accessories on the opposite side. In a similar manner, the cylinder head can be reversed regardless of the position of the blower, to place the exhaust and water manifolds on either the

same or the opposite side as the blower. By shifting one gear in the gear train and changing the camshaft and oil-pump cover, the rotation of the camshaft can be made either clockwise or counter-clockwise with any of the above accessory arrangements. The generator and air compressor, or vacuum pump, can be mounted over the gear housing and driven direct from the cam and balance-shafts, or secured to the side of the crankcase and belt-driven. Fuel injectors are identical for all models. All of these assemblies can be made with a few right- and left-hand parts, the result being eight distinct models of each engine size.

SIMMONS MUFFLERS

ARE EASY TO INSTALL



Because

They come to you complete in one package—the muffler and all end plates necessary to adapt the muffler to every car in the group it serves.

Patented end plate construction eliminates bushings—Simmons interchangeable end plates are bolted to the muffler making a positive, tight connection.

Fit all cars and trucks—doubly reinforced—20-gauge steel—locked seams—leak-proof—self-cleaning—automatic by-pass.

New Catalog Ready For You

Write for new catalog No. 311 containing all latest data on mufflers and pipes for 1937 and 1938 models. This catalog is the most up-to-date muffler listing in circulation today.

• SIMMONS • Tail Pipe Display Stand

To properly stock and display tail pipes, order a stand, as illustrated, thru your jobber. Sell a new tail pipe every time you install a new muffler. Stand holds 53 pipes.



The SIMMONS
MANUFACTURING CO.
ASHLAND, OHIO

Manufacturers of replacement parts for Ford, Chevrolet and Plymouth, Silver King and Power King Hydraulic Jacks, Mufflers for all cars; Carburetors for all cars.

SEND NEW MUFFLER CATALOG TO:

NAME _____

ADDRESS _____

CITY _____

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Divd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE															CHASSIS					
					No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to-1.)	Displacement Factor %	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Bantam 60	439	75	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	Al	Gear	Als	No	No	Til	Buf	A	Wil	P.Ro	WG	Nb-UP	1/2 Spi	5.87 Tr		
2	Buick 38-40	1022	122	6.50/16	8-3 1/2 x 4 1/2	30.6	248.0	107-3400	6.15	39.2	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	1/4 Own	4.40 IC	
3	Buick 38-60	1272	126	7.00/15	8-3 1/2 x 4 1/2	37.8	320.2	141-3600	6.35	42.3	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	1/4 Own	3.90 IC	
4	Buick 38-80	1645	133	7.00/16	8-3 1/2 x 4 1/2	37.8	320.2	141-3600	6.35	39.3	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	1/4 Own	4.18 IC	
5	Buick 38-90	2176	140	7.50/16	8-3 1/2 x 4 1/2	37.8	320.2	141-3600	6.35	38.6	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	1/4 Own	4.55 IC	
6	Cadillac V8-38-60-60S	2085	127	7.00/16	8-3 1/2 x 4 1/2	39.2	346.0	135-3400	6.25	42.8	Cl	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	1/4 Own	3.92 IC	
7	Cadillac V8-38-65	2285	132	7.50/16	8-3 1/2 x 4 1/2	39.2	346.0	135-3400	6.25	42.8	Cl	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	1/4 Own	4.58 IC	
8	Cadillac V8-38-75	3075	141	7.50/16	8-3 1/2 x 4 1/2	39.2	346.0	140-3400	6.70	39.7	Cl	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	1/4 Own	4.58 IC	
9	Cadillac V-16-38-90	5135	141	7.50/16	16-3 1/2 x 3 3/4	67.6	431.0	185-3600	6.80	...	Cl	Mor	Ala	Fram	AC	Car	Wal	D	Del	P.Long	Own	Nb-Mec	1/4 Own	4.31 IC	
10	Chevrolet HB Master	730	112 1/4	6.00/16	6-3 1/2 x 3 3/4	29.4	216.5	85-3200	6.25	35.7	Cl	Own	Cl	No	AC	Car	Own	D	D	P.Own	Own	m-Own	1/4 Own	3.72 C	
11	Chevrolet HA Del.	796	112 1/4	6.00/16	6-3 1/2 x 3 3/4	29.4	216.5	85-3200	6.25	39.7	Cl	Own	Cl	No	AC	Car	Own	D	D	P.Own	Own	m-Own	1/4 Own	4.22 IC	
12	Chrysler Roy. C-18	998	119	6.25/16	6-3 1/2 x 4 1/2	27.3	241.5	95-3600	6.20	39.3	Cl	Mor	Ala	Pur	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	1/4 Own	4.10 IC	
13	Chrysler Imp. C-19	1198	125	6.50/16	8-3 1/2 x 4 1/2	33.8	298.6	110-3400	6.20	39.5	Cl	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	1/4 Own	3.91 IC	
14	Chrysler Cus.Im.C-20	2295	144	7.50/16	8-3 1/2 x 4 1/2	33.8	323.5	130-3400	6.50	...	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	1/4 Own	4.55 IC	
15	De Soto S-5	958	119	6.00/16	6-3 1/2 x 4 1/2	27.3	228.1	93-3600	6.50	37.8	Cl	Mor	Ala	Pur	AC	Car	NS	A	Wil	P.B&B	Own	Nb-UP	1/4 Own	4.10 IC	
16	Dodge Six	898	115	6.00/16	6-3 1/2 x 4 1/2	25.3	217.8	87-3600	6.50	38.0	Cl	Mor	Als	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	1/4 Own	4.10 C	
17	Ford V8-60	685 1/2	112	5.50/16	8-2 1/2 x 3 1/2	21.6	136.0	60-4200	6.60	30.0	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	4.44 Tr	
18	Ford V8-85	710 1/2	112	6.00/16	8-3 1/2 x 3 3/4	30.0	221.0	85-3800	6.12	37.5	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	4.44 Tr	
19	Graham Std., Spec.	1065	120	6.25/16	6-3 1/2 x 4 1/2	25.3	217.8	90-3600	6.70	35.3	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	1/4 Spi	4.27 C	
20	Graham S.C., Cus.S.C.	1290	120	6.25/16	6-3 1/2 x 4 1/2	25.3	217.8	116-4000	6.70	...	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	1/4 Spi	4.27 C	
21	Hudson 112 89	755	112	5.50/16	6-3x4 1/2	21.6	175.0	83-4000	6.50	...	Cl	GED	Al	No	Bur	Car	Old	A	Nat	P.Own	Own	Nb-Spi	1/4 Own	4.11 C	
22	Hudson-Terrapl. 81	864	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	38.0	Cl	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	1/4 Own	4.11 C	
23	Hudson-Terrapl. 82	915	117	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	37.5	Cl	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	1/4 Own	4.11 C	
24	Hudson 6 83	984	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.7	Cl	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	1/4 Own	4.11 C	
25	Hudson 8, 84, 5, 7	1060	122, 129	6.50/16	8-3x4 1/2	28.8	254.5	122-4200	6.25	41.2	Cl	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	1/4 Own	4.11 C	
26	Hupmobile Six E	1045	122	6.25/16	6-3 1/2 x 4 1/2	29.4	245.3	101-3600	5.75	42.2	Cl	Mor	Als	No	AC	Car	Old	A	Wil	P.B&B	WG	Nb-Spi	1/4 Spi	4.54 C	
27	Hupmobile Eight H	1325	125	6.50/16	8-3 1/2 x 4 1/2	32.5	303.2	120-3600	5.80	44.5	Cl	Mor	Als	No	AC	Car	Old	A	Wil	P.B&B	WG	Nb-Spi	1/4 Spi	4.54 C	
28	La Salle V8, 38-50	1380	124	7.00/16	8-3 1/2 x 4 1/2	36.4	322.0	125-3400	6.25	40.7	Cl	Mor	Ala	No	AC	Car	Wal	D	Del	P.Long	Own	Nb-Mec	1/4 Own	3.92 IC	
29	Lincoln V12	(i) 1375 1/2	136-145	7.50/17	12-3 1/2 x 4 1/2	46.8	414.0	150-3400	6.38	34.3	Al	Ch	Al	Pur	AC	Str	Own	O	Exi	P.Long	Own	m-Spi	FF Tim	4.58 C	
30	Lincoln-Zephyr	1375 1/2	125	7.00/16	12-2 1/2 x 3 3/4	36.3	267.0	110-3900	6.70	40.8	Al	Gear	CS	No	Fram	CG	Own	O	Own	P.Own	Own	m-Spi	3/4 Own	4.44 Tr	
31	Nash Lafay 3810	850	117	6.00/16	6-3 1/2 x 4 1/2	27.3	234.8	95-3400	5.83	38.4	Cl	Whit	Als	No	AC	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	1/4 Own	4.11 C	
32	Nash Amb. 6, 3820	1050	121	6.25/16	6-3 1/2 x 4 1/2	27.3	234.8	105-3400	6.00	35.5	Cl	Whit	Als	BS	AC	Mar	Wal	A	USL	P.B&B	Own	Nb-Mec	1/4 Own	4.11 C	
33	Nash Amb. 8, 3880	1200	125	7.00/16	8-3 1/2 x 4 1/2	31.2	260.8	115-3400	6.00	35.0	Cl	Dia	Als	BS	Bur	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	1/4 Own	4.10 C	
34	Oldsmobile F-38	967	117	6.50/16	6-3 1/2 x 4 1/2	28.4	229.7	95-3400	6.10	38.4	Cl	Whit	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	1/4 Own	4.37 IC	
35	Oldsmobile L-38	1078	124	7.00/16	8-3 1/2 x 4 1/2	33.8	257.1	110-3600	6.20	41.7	Cl	LB	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	1/4 Own	4.37 IC	
36	Packard Six 1600	1175	122	6.50/16	6-3 1/2 x 4 1/2	29.4	245.3	100-3600	6.52	40.0	Cl	Mor	Als	Pur	AC	CG	Old	D	Wil	P.Long	Own	Nb-Mec	1/4 Own	4.54 IC	
37	Packard Eight 1601, 2	1325	127, 48	7.00/16	8-3 1/2 x 4 1/2	33.8	282.0	120-3800	6.60	41.4	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-UP	1/4 Own	(b) IC	
38	Pack. Sup. 8 1603, 4.5	2790	127-34-39	7.50/16	8-3 1/2 x 5	32.5	320.0	130-3200	6.50	40.0	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-UP	1/4 Own	4.69 IC	
39	Pack. Twelve 1607, 8	4155	134, 39	8.25/16	12-3 1/2 x 4 1/2	56.7	473.0	175-3200	6.40	45.3	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-Spi	1/4 Own	4.41 IC	
40	Pierce-Arrow 1801	3375	138-147	(g)	8-3 1/2 x 5	39.2	385.0	150-3400	6.40	37.6	Al	Whit	Ala	Pur	AC	Str	Buf	D 1/2	Wil	P.Long	WG	Nb-UP	1/4 Own	4.58 C	
41	Pierce-Arrow 1802	3895	138-144	7.50/17	12-3 1/2 x 4	58.8	462.0	185-3400	6.40	42.0	Al	Whit	Ala	Pur	AC	Str	Buf	D 1/2	Wil	P.Long	WG	Nb-UP	1/4 Own	4.58 C	
42	Pierce-Arrow 1803	5015	147	7.50/17	12-3 1/2 x 4	58.8	462.0	185-3400	6.40	40.7	Al	Whit	Ala	Pur	AC	Str	Buf	D 1/2	Wil	P.Long	WG	Nb-UP	1/4 Own	4.58 C	
43	Plymouth P5	730	112	5.50/16	6-3 1/2 x 4 1/2	23.4	201.3	82-3600	6.70	35.6	Cl	Mor	Ala	No	BA	BC	Car	NS	A	Wil	P.B&B	Own	Nb-UP	1/4 Own	3.90 C
44	Plymouth P6	803	112	6.00/16	6-3 1/2 x 4 1/2	23.4	201.3	82-3600	6.70	36.2	Cl	Mor	Ala	No	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	1/4 Own	4.10 C	
45	Pontiac 6 38-26DA	916	117	6.00/16	6-3 1/2 x 4	28.3	222.7	85-3520	6.20	37.4	Cl	Mor	CHI	No	AC	Car	Buf	D	Del	P.Own	Own	Nb-Mec	1/4 Own	4.37 IC	
46	Pontiac 8 38-28DA	980	122	6.50/16	8-3 1/2 x 3 3/4	33.8	248.9	100-3700	6.20	40.0	Cl	Mor	CHI	No	AC	Car	Buf	D	Del	P.Own	Own	Nb-Mec	1/4 Own	4.37 IC	
47	Stude. Six & Com.	965	116 1/2	6.00/16	6-3 1/2 x 4 1/2	26.3	228.0	90-3400	6.00	41.2	Cl	Dia	Ly	Fram	AC	Str	Buf	A	Wil	P.B&B	WG	Ru-Th	1/4 Spi	4.55 IT	
48	Studebaker. Pres. 4C	1195	122	6.50/16	8-3 1/2 x 4 1/2	30.0	250.4	110-3600	6.00	41.6	Cl	Dia	Ly	Fram	AC	Str	Buf	D	Wil	P.Long	WG	Nb-Spi	1/4 Spi	4.55 IT	
49	Willys 38	573	100	5.50/16	4-3 1/2 x 4 1/2	15.6	134.2	48-3200	5.70	31.6	Cl	LB	Cl	F-O	AC	Til	Buf	A	USL	P.R-B	WG	m-UP	1/4 Own	4.30 C	

ABBREVIATIONS-General

○—Others also
 *—Measured on rim of Flywheel
 1/2—Semi-floating
 3/4—Three-quarter floating
 ††—With clearance of .015 the valve is .004 off its seat.
 †—Does not include Federal Taxes
 §—Computed on basis of displacement, gear ratio, effective tire

diameter, and weight with normal load.

(a) — (-1/4 to +1/2)
 A—Above (rods removed from)
 A—After top center
 AA—Automatic adjuster
 Ad—Advanced
 Al—Aluminum
 Ala—Aluminum, Anode processed
 Als—Aluminum with struts
 Au—Automatic
 (b) — 4.30-1601; 4.70-1602

B—Below (rods removed from)
 B—Before top center
 Bm—Before marks on vibration damper
 (c) — 1-1/2, 1-3/4
 C—Conventional
 C—Cold (Tappet clearance)
 Ch—Chain
 CHI—Chrome Nickel Iron
 Cl—Cast Iron CS—Cast Steel
 CSM—Chain sprocket markings
 (d) — 0-0+1/2 (e) — 0-0+1/2

(f) — 1/2+1/2=0
 F—Floating (Piston Pin)
 FF—Full floating
 (g) — 138 in -7.00/17; 147 in -7.50/17
 H—Hot (tappet clearance)
 (i) — 4900-5100 IC—Independent coil
 IT—Independent Transverse
 (k) — Intake .0125; Exhaust .0156
 Ly—Lynite
 m—Metal
 M—Mechanical N—Negative
 (n) — Intake .0124; Exhaust .0156

Nb—Needle bearing
 P—Piston (Pin Locked in)
 P—Single plate clutch
 PH—Power operated, hydraulic brakes R—Rod (Pin locked in)
 RS—Radial Safety Control
 (r) — Out only Ru—Rubber
 TC—Top Center
 Tr—Transverse
 Var—Various
 x—At 1000 R.P.M.
 y—At 2800 R.P.M.

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make and Type	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS		Piston Pin Diameter	Piston Pin Locked In	VALVES					IGNITION					FRONT AXLE					Line Number																																																																																																																													
				No. and Width Comp.	No. and Width Oil			Head Diameter and Seat Angle			Operating Tappet Clearance	Intake Valve Opens Before or After T.C.	Intake Valve Clearance for Valve Timing	No. of Degrees	No. of Flywheel Teeth	Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)		Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)																																																																																																																						
								Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)																					Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Inlet	Exhaust																																																																																																																		
OM La	90 Ch-6	2-3/8 1-1/8 3/8	R	1 1/2 30 1 1/2 30 .279 .006 .006 .006 19B 4 1/2 B .022 .025 2 1/2 B 1B Au A 1 1/8 1 1/4 1 1/2 7 5 1/2 0° 9' 1 1/2 1	OH S	112 AC-46	2(c) 2-1/8 1 1/8 3/8 R R 1 1/2 45 1 1/2 45 .372 .015H .015H 13B 5 1/2 B .015 .025 4B 1 1/2 B Au A 2 1.21 6 13 1/4 N 1/2 1/4 +1 0-1/8 3 1/2-4 1/2 2	OH S	114 AC-46	2(c) 2-1/8 1 1/8 3/8 R R 1 1/2 45 1 1/2 45 .372 .015H .015H 14B 6B .015 .025 6B 2 1/2 B Au A 2 1/4 1.31 8 17 N 1/2 1/4 +1 0-1/8 3 1/2-4 1/2 3	OH S	114 AC-46	2(c) 2-1/8 1 1/8 3/8 R R 1 1/2 45 1 1/2 45 .372 .015H .015H 14B 6B .015 .025 6B 2 1/2 B Au A 2 1/4 1.31 8 17 N 1/2 1/4 +1 0-1/8 4 1/2-5 1/2 4	OH S	114 AC-46	2(c) 2-1/8 1 1/8 3/8 R R 1 1/2 45 1 1/2 45 .372 .015H .015H 14B 6B .015 .025 6B 2 1/2 B Au A 2 1/4 1.31 8 17 N 1/2 1/4 +1 0-1/8 4 1/2-5 1/2 5	BH S	155 AC-45	2-1/8 2-3/8 7/8 F 1.88 45 1.63 45 .341 AA AA AA TC TC .015 .027 5B 2 1/2 B Au A 2.46 2 1/2 7 24 N 3/4-0 1/4-1 1 1/8-3/8 4° 51' 6	BH S	155 AC-45	2-1/8 2-3/8 7/8 F 1.88 45 1.63 45 .341 AA AA AA TC TC .015 .027 5B 2 1/2 B Au A 2.46 2 1/2 7 25 0-1/4 0-1/2 1 1/8-3/8 5° 38' 7	BH S	170 AC-45	2-1/8 2-3/8 7/8 F 1.88 45 1.63 45 .341 AA AA AA TC TC .015 .027 5B 2 1/2 B Au A 2.46 2 1/2 7 25 0-1/4 0-1/2 1 1/8-3/8 5° 38' 8	BH S	180 AC-45	2(c) 2-1/8 1 1/8 3/8 R 1.50 45 1.37 45 .341 AA AA AA 8B 3 1/2 B .015 .027 6B 2 1/2 B Au A 2 1 1/4 11 30 0-1/4 0-1/2 1 1/8-3/8 5° 38' 9	OH O	AC-46	2-1/8 1-1/8 3/8 R 1 1/2 30 1 1/2 30 .340 .006H .013H .006 9B 3 1/2 B .021 .040 5B 2B Au A 2 1/8 1 1/2 5 14 1 1/4-2 1/4 1/2-1 1/2 7° 10' 10	OH O	AC-46	2-1/8 1-1/8 3/8 R 1 1/2 30 1 1/2 30 .340 .006H .013H .006 9B 3 1/2 B .021 .040 5B 2B Au A 2 1/8 1 1/2 5 14 1 1/4-2 1/4 1/2-1 1/2 7° 10' 11	LH G	145x Ch-J-8	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .008H .010H .014 8B 3 1/2 B .020 .025 TC TC Au A 2 1/8 1 1/2 5 20 1/2-2 1/2 (a) 0-1/8 4 1/2-6 12	LH G	145x Ch-J-8	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .008H .010H .011 2B 3 1/2 B .018 .025 TC TC Au A 2 1/8 1 1/2 6 20 1/2-2 1/2 (a) 0-1/8 4 1/2-6 13	LH G	155x Ch-H-10	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .006H .010H .011 2B 3 1/2 B .018 .025 TC TC Au A 2 1/8 1 1/2 6 20 1-3 (a) 0-1/8 4 1/2-6 14	LH G	145x A-A-7	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .008H .010H .014 8B 3 1/2 B .020 .025 TC TC Au A 2 1/8 1 1/2 5 20 1/2-2 1/2 (a) 0-1/8 4 1/2-6 15	LH O	140x Ch-J-8	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .006H .008H .011 6A 2 1/2 A .020 .025 4A 1 1/2 A Au A 2 1/8 1 5 15 1-3 1/4-3/4 0-1/8 4 1/2-5 1/2 16	OM O	150y Ch-H-10	2-3/8 1-3/8 1/2 F 1.28 45 1.28 45 .279 .013C .013C .013 9 1/2 B .015 .025 4B 1 1/2 B Au A 1.60 1.54 4 15 2 8 1 1/8-1/8 8 17	OM O	100 Ch-7	2-3/8 1-3/8 1/2 F 1.28 45 1.28 45 .310 .013C .013C .013 9 1/2 B 3B .015 .025 4B 1 1/2 B Au A 2 1 1/2 5 22 8 1 1/8-1/8 8 18	OH R	160x Ch-J-9	2-3/8 1-1/8 1/2 R 1 1/2 30 1 1/2 45 1/8 .010H .010H .012 4 1/2 B 1 1/2 B .018 .025 4B 1 1/2 B Au A 2 1/8 1 1/8 5 15 3-4 1 1/8-1/8 7 1/2 19	OH R	120 Ch-J-9	2-3/8 1-1/8 1/2 R 1 1/2 30 1 1/2 45 1/8 .010H .010H .012 4 1/2 B 1 1/2 B .018 .025 4B 1 1/2 B Au A 2 1/8 1 1/8 5 15 3-4 1 1/8-1/8 7 1/2 20	HM G	115 Ch-J-8-A	2-3/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .006 .008 .008 10 1/2 B 4B .020 .032 TC TC Au A 1 1/8 1 1/8 4 12 2-3 1-1 1/2 0-1/8 7 21	HM G	120 Ch-J-8-A	2-3/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .006 .008 .008 10 1/2 B 4B .020 .032 TC TC Au A 1 1/8 1 1/8 4 12 2-3 1-1 1/2 0-1/8 7 22	HM G	120 Ch-J-8-A	2-3/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .006 .008 .008 10 1/2 B 4B .020 .032 TC TC Au A 1 1/8 1 1/8 4 12 2-3 1-1 1/2 0-1/8 7 23	HM G	120 Ch-J-8-A	2-3/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .006 .008 .008 10 1/2 B 4B .020 .032 TC TC Au A 1 1/8 1 1/8 4 12 2-3 1-1 1/2 0-1/8 7 24	HM G	118 Ch-J-8-A	2-3/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .006 .008 .008 10 1/2 B 4B .017 .032 TC TC Au A 1 1/8 1 1/8 7 17 2-3 1-1 1/2 0-1/8 7 25	H G	Ch-7	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .341 .010 .013 2B 3 1/2 B .022 .027 7B 2 1/2 B Au A 2 1/8 1 1/4 6 18 1 1/2 1 1/8-3/8 8 1/2 26	H G	Ch-7	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .341 .006 .013 .010 1A 3 1/2 A .022 .027 7B 2 1/2 B Au B 2 1/8 1 1/4 8 21.5 1 1/2 1 1/4 1/8-1/8 7 1/2 27	BH S	155x AC-45	2-1/8 2-3/8 7/8 F 1.88 45 1.63 45 .341 AA AA AA TC TC .015 .027 5B 2 1/2 B Au A 2 1/2 2 1/2 7 25 N 3/4-0 1/4-1 1 1/8-3/8 4° 51' 28	OM O	105 Ch-7	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 1/8 AA AA AA 21B 6 1/2 B .020 .029 7B 2 1/2 B Au B 2 1/8 2 12 32 4 1 1/4 1/8-1/8 7 1/2 29	OM O	105 Ch-H-10	2-1/8 2-3/8 7/8 F 1.54 45 1.54 45 .311 AA AA AA 19 1/2 B 6B .015 .029 4B 1 1/2 B Au B 2 1/8 1.57 5 30 1 1/2 3/4 1/8-1/8 4 30	BH G	110 A-B-7	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .340 .015 .015 .015 CSM CSM .020 .025 4A 1 1/2 B Au A 2 1.42 6 20 1-2 0-1 1/2 7 31	BH G	125 AC-45	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .372 .008H .015H .008 CSM CSM .020 .025 4B 1 1/2 B Au A 2 1.42 7 20 1-2 0-1 1/2 7 32	BH G	125 AC-45	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .375 .015H .015H .015 CSM CSM .020 .025 9B 2 1/2 B Au B 2 1.24 7 18 1-2 0-1 1/2 7 33	BH S	146x AC-45	2-1/8 2-3/8 7/8 P 1 1/2 30 1 1/2 45 .008H .011H (k) 5B 2B .020 .040 TC TC Au A 2 1/8 1 1/8 6 17 0-N 3/4 1/8-1 1 1/8-3/8 4° 51' 34	BH S	152x AC-45	2-1/8 2-3/8 7/8 P 1 1/2 30 1 1/2 45 .008H .011H (n) TC TC .015 .030 2B 3 1/2 B Au A 2 1/8 1 1/8 7 21 0-N 3/4 1/8-1 1 1/8-3/8 4° 51' 35	H O	110 AC-103	2-1/8 1-3/8 7/8 F 1.57 30 1 1/2 45 .340 .007H .010H .010 1B 3 1/2 B .020 .028 6B 2 1/2 B Au A 2 1/8 1 1/4 6 15 1 1/2-1 1/2 1 1/4-1 1/2 (e) 1° 54' 36	H O	110 AC-103	2-1/8 1-3/8 7/8 F 1 1/2 45 1 1/2 45 .340 .007H .010H .010 1B 3 1/2 B .015 .028 8B 3B Au A 2 1/8 1 1/4 6 16 1 1/2-1 1/2 1 1/4-1 1/2 (e) 1° 54' 37	H O	110 AC-103	2-1/8 1-3/8 7/8 F 1 1/2 45 1 1/2 45 .340 .006H .008H .008 30B 12 1/2 B .015 .028 6B 2 1/2 B Au B 2 1/8 1 1/4 8 20 2 1/2-1 1/2 1 1/4-1 1/2 (f) 1 1/2 38	BPH O	110 AC-103	2-1/8 1-3/8 7/8 F 1 1/2 45 1 1/2 45 .340 AA AA .008H .008 TC TC .020 .028 6B 2B Au B 2 1/8 1 1/8 10 40 (d) 1 1/4 (f) 1 1/2 39	Ste R	80 Ch-J-6	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .372 AA AA .010 5A 1 1/2 A .018 .025 2B 1 1/2 B Ad A 2 1/4 1 1/4 10 25 1 1/4 1/8 8 40	Ste R	85 Ch-J-6	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .372 AA AA .004 19B 6B .018 .025 5B 1 1/2 B Ad A 2 1/4 1 1/4 13 38 1 1/4 1 1/8 8 41	Ste R	85 Ch-J-6	2-1/8 2-3/8 7/8 F 1 1/2 45 1 1/2 45 .372 AA AA .004 19B 6B .018 .025 5B 1 1/2 B Ad A 2 1/4 1 1/4 13 38 1 1/4 1 1/8 8 42	LH O	145x Ch-J-8	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .006H .008H .011 6A 2 1/2 A .020 .025 4A 1 1/2 A Au A 1 1/8 1 5 14 1-3 1/4-3/4 0-1/8 4 1/2-5 1/2 43	LH O	145x A-A-7	2-1/8 2-3/8 3/4 F 1 1/2 45 1 1/2 45 .340 .006H .008H .011 6A 2 1/2 A .020 .025 4A 1 1/2 A Au A 1 1/8 1 5 14 1-3 1/4-3/4 0-1/8 4 1/2-5 1/2 44	HM S	141x AC-45	2-1/8 1-1/8 3/8 P 1 1/2 30 1 1/2 45 .310 .012H .012H .015 5B 2B .020 .025 2B 3 1/2 B Au A 2 2 1 1/4 6 16 N 1 1/2-1 1/2 3 1/4-1 1/4 0-1/8 4° 51' 45	HM S	141x AC-45	2-1/8 1-1/8 3/8 P 1 1/2 30 1 1/2 45 .310 .012H .012H .015 5B 2B .020 .025 2B 3 1/2 B Au A 2 2 1 1/4 7 19 N 1 1/2-1 1/2 3 1/4-1 1/4 0-1/8 4° 51' 46	LH R	105 Ch-8-A	2-1/8 1-1/8 7/8 R 1 1/2 45 1 1/2 45 .016C .016C .020 15B 5 1/2 B .020 .025 2B 3 1/2 B Au A 2 1/8 1 1/8 5 14 1/2 45 1/2 1/8-1/8 5 1/2 47	LH R	105 Ch-8-A	2-1/8 1-1/8 7/8 R 1 1/2 45 1 1/2 45 .016C .016C .020 15B 5 1/2 B .020 .025 TC TC Au A 1 1/8 1 1/8 5 14 1/2 45 1/2 1/8-1/8 5 1/2 48	BM G	87 Ch-C-7	3-3/8 1-1/8 1 1/8 F 1 1/2 45 1 1/2 45 .371 .004H .006H .010 TC TC .020 .025 5A 1 1/2 A Au A 1 1/8 1 1/4 4 11 3 2 1/8 1/8 7 1/2 49

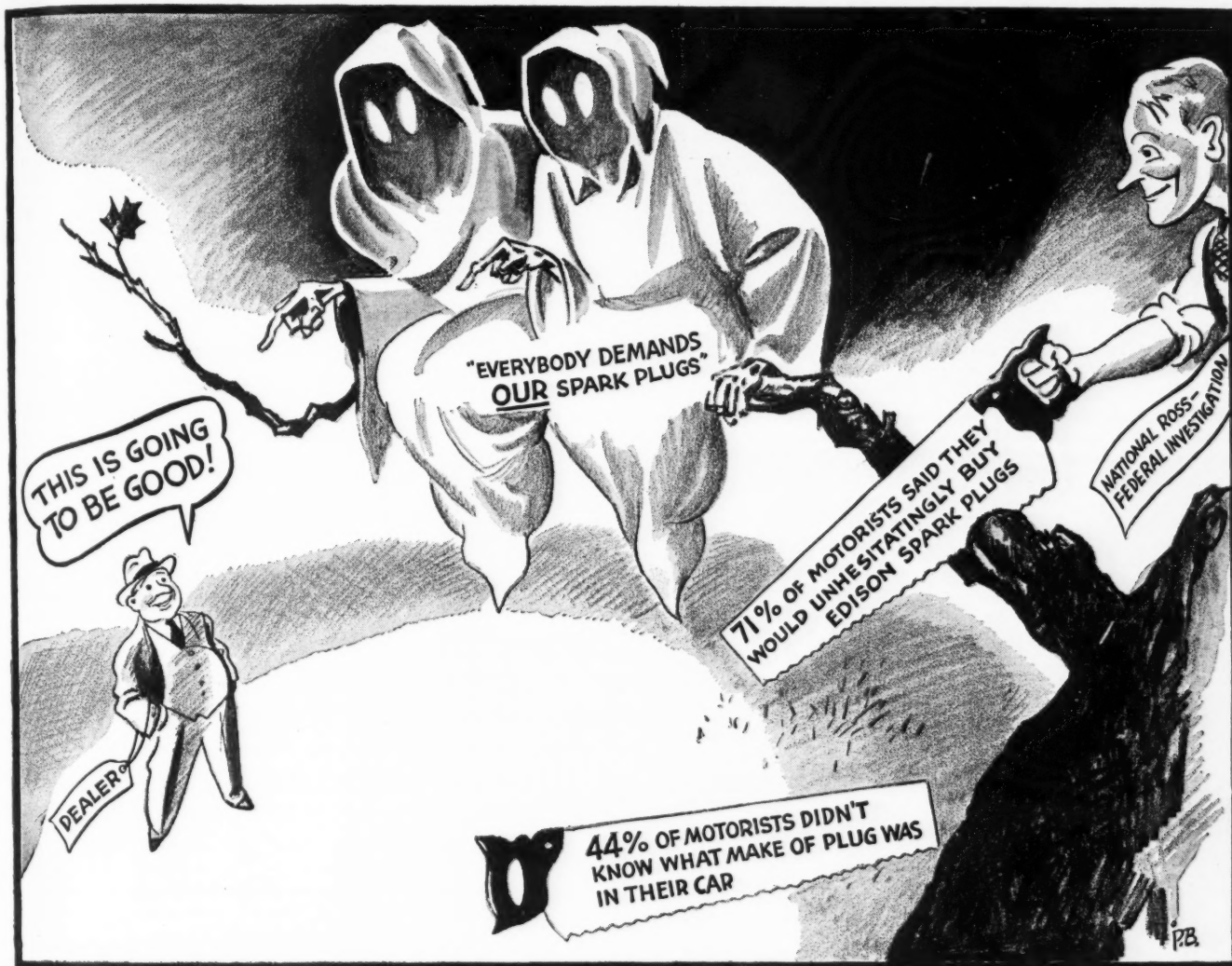
Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BANTAM			CHEVROLET (Cont.)			GRAHAM			HUPMOBILE (Cont.)			OLDSMOBILE (Cont.)			PIERCE-ARROW (Cont.)		
Pick-up.....	465		Spt. Sed., Trk., 4d	750	2845	Standard Coupe	995		Eight Tour. Sed., 4d..	1325	3800	Sedan, 2d	1027	3475	Twelve Model 1802		
Panel.....	479		Bus. Coupe, 2d	648		Comb. Coupe	1045		DeL. Tr. Sed., 4d	1365	3800	Tour. Sedan, 2d	1053	3465	Sedan		3895
Bus. Coupe	439		Cabriolet, 2d	755		Sedan, 4d..	1065		Cus. Tr. Sed., 4d.	1485	3850	Sedan, 4d	1078	3490	Club Sedan		4000
Std. Coupe	469											Tour. Sedan, 4d	1104	3480	Coupe		3895
Roadster	479		Master De Luxe Series HA			Special Bus. Coupe	1095		LA SALLE			Conv. Coupe, 2d.	1160	3530	Conv. Roadster		4000
			Sedan, 4d	796	2915	Comb. Coupe	1135		Series 38-50						Club Berline		4155
			Coach, 2d	730	2900	Sedan, 4d	1155		Conv. Coupe	1420	3735				Formal Sedan		4155
Special 43			Tn. Sed., Trk., 2d.	750	2915				Conv. Sedan	1825	3870				Sedan, 7 p.		4210
Sport Sedan, 2d	981	3515	Spt. Sed., Trk., 4d	817	2940	Supercharger			Coupe	1295	3745				Enc. Dr. Lim		4360
Tour. Sedan, 2d	1006	3520	Bus. Coupe, 2d	714		Bus. Coupe	1230		Tour. Coupe	1345	3800				Brunt Town Bro.		6040
Sport Sedan, 4d	1022	3535	Sport Coupe, 2d	750	2870	Comb. Coupe	1270		Tour. Sedan, 4d.	1385	3830				Conv. Sedan		4820
Tour. Sedan, 4d	1047	3560				Sedan, 4d	1290										5921
Bus. Coupe, 2d	945	3385															
Sport Coupe, 2d	1001	3425															
Conv. Coupe, 2d	1103	3575															
Conv. Phae., 4d	1406	3705															
														</			

•—5 Wheel Equipment

†—6 Wheel Equipment



71% Said They Would Unhesitatingly Buy Edison Spark Plugs!

These are *facts*! Facts gathered by a large staff of trained Ross-Federal investigators. From the Atlantic to the Pacific . . . from Canada to Mexico . . . from New York and Chicago to Bad Axe and Oscaloosa, these investigators talked with thousands and thousands of motorists. They even raised the hoods of every car to check the accuracy of their findings.

The consumer evidence they uncovered is so conclusive and so startling that it is bound to revise the industry's thinking regarding replacement selling. It completely frees the independent retailer from the profit restricting "bug-a-boo" of the old "car equipment" traditions. It makes the independent retailer really independent.

MOTOR AGE, March, 1938

44% Didn't Know What Kind of Plugs Were In Their Car!

HERE ARE MORE FACTS: Retailers make more money selling Edison because they make a better profit per sale and never have to face cut-price competition. Edisons are sold only through legitimate, independent retail outlets. *And remember too!* 71% said they would unhesitatingly buy Edison Spark Plugs.

EDISON-SPLITDORF CORPORATION
West Orange New Jersey

Edison
SPARK PLUGS

ALBANITE CORE
EDISPARK
BUILT-IN LEAK-
PROOF GASKET



When writing to advertisers please mention Motor Age

Repairmen's Asso. Buys Cooperatively

Lehigh Valley Group Follows Buying Plan

The Master Automobile Repairmen's Association of the Lehigh Valley, recently organized with 60 members, has formed a cooperative buying plan whereby all members who purchase one share of stock of the cooperative become eligible to share in the profits and discounts earned. No member can purchase more than five shares of stock. This is designed to prevent any one member from gaining controlling interest. Shares may be paid for on easy payments.

It is estimated that there are 500

independent garage operators in the Lehigh Valley who are eligible for membership in the association, and plans are being made to conduct a membership campaign in the near future. Membership fees at present are \$6 annually.

Officers of the association are: E. J. Harwick, president; Herbert Miller, secretary and treasurer; Tilghman Freed, buyer and director, with offices and warehouse at Fourth and Linden Streets, Allentown, Pa.

Objectives of the association as out-

lined by Mr. Freed are: To conduct a publicity campaign for the benefit of independent garage operators; to meet chain store competition by offering garage customers automotive supplies at prices advertised by chain operators and to discourage the use of services offered by some chain store units as a means of attracting customers for profitable items.

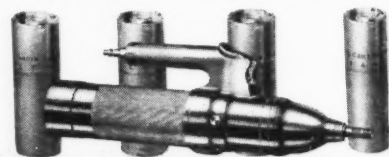
Motor Age

Annual Spring Service and Tune-Up Issue

NEXT MONTH

Lube Gun New Features

A new power gun, embodying a series of unusual features, was recently announced by the Lubrication Corp., 910 South Michigan Ave., Chicago, Ill. Known as the Standix Power Gun, it operates from interchangeable cartridges which are refilled from stock lubricants. It is furnished with



an assortment of adapters, to handle all grades of lubricant.

Another feature is that it can be converted from high pressure, high speed, single shot action to low pressure continuous flow. This is accomplished by changing the nozzles.

It has a pistol grip for direct application, and a horizontal grip for whip hose use.

Lathe Work

(Continued from page 14)

that the cutting edge is exactly on the center line of the work. Then, with the armature being driven at 300 to 400 r.p.m., the tool is fed slowly taking a light cut.

After the commutator is true, the mica should be undercut if it is from a generator. Starting motor commutators are usually not undercut.

Special attachments are available for undercutting. The device illustrated utilizes short pieces of hack saw blades. Lock the lathe carriage in position so that when the lever of the undercutter is pushed to the extreme left, the blade of the undercutter will almost touch the shoulder of the commutator. Turn the adjusting screw as shown in the illustration so that the mica will be undercut about 1/64 in. deep. Also, adjust the undercutter swivel so that the blade is aligned with the segments. After undercutting, the commutator should be polished with fine sandpaper.

HALL

ECCENTRIC

Valve Seat Grinder

For MORE and BETTER Valve Jobs in LESS TIME... at MORE PROFIT.



The HALL Model E-J Service Grinder and Diamond Dresser Stand shown at left are furnished in metal case. Complete Grinder Sets for any or all cars and trucks are available.

IF MORE THAN 50 FACTORIES have found nothing to equal it for Production or Service... how can YOU expect to?

See it at your JOBBER'S or write the Factory today!

THE HALL MANUFACTURING COMPANY 1602 WOODLAND AVE. TOLEDO, OHIO

HALL HYDRAULIC BRAKE HONES

● Any shop can afford these Hones; no shop doing any brake servicing can afford to be without them. Master and wheel cylinders can be reconditioned like new in a matter of minutes and with more profit than from replacement of cylinders. Sold singly or in 3-Hone Passenger Car and 4-Hone Universal Sets.



Passenger Car **\$15** Set

New South Bend Lathe General Catalog

The South Bend Lathe Works, South Bend, Ind., announce a new 72-page General Catalog, No. 97, profusely illustrating and describing the entire line of back-gear, screw-cutting, metal-working precision lathes which the company manufactures.

The catalog shows the new Series "R" and Series "N" lathes in sizes 9-inch, 11-inch, 13-inch, 15-inch, and 16-inch swing, and in bed length from 3 feet to 12 feet. Illustrated and described for the first time is the new South Bend 9-inch Large Spindle Hole Lathe having a 1 1/2-inch hole through the spindle and taking collets up to 1-inch in diameter.

The catalog will be of valuable assistance to engineers, mechanics, machinists, and all interested in machine shop practice.

Any reader interested in securing a free copy of the new No. 97 General Catalog should write the technical service department, South Bend, Ind., mentioning this magazine.

500 Enroll in Bear School

Further evidence of the growing momentum of the safety movement and the definite trend toward better training of automotive service men is shown by the statistics just released by Will Dammann, president of the Bear Mfg. Co. During 1937, over 500 repair men enrolled in the Bear School at Rock Island, coming from not only the United States but from such far flung places as New Zealand and South Africa.

In addition to the record breaking enrollment at the Bear School in Rock Island, other Bear Schools at Toronto, New York, Boston, Salisbury, N. C., Newark, Los Angeles, Portland, Ore., and Chicago also topped all previous attendance records.

"The purpose of these free schools," explains Will Dammann, "is to meet the demand for trained mechanics who not only know how to operate wheel alignment, frame and axle straightening, brake testing, headlight testing and other safety and correction equipment, but also how to sell these services to the car owner."



"My husband says I've stripped the gears on our car and I want you to send a man out to - er - dress them!"

Longer Piston Ring Life With Tighter Pistons

Piston ring life has nearly doubled in the past five years, according to an investigation made recently among service managers by the Bohn Aluminum and Brass Corporation. This result has been accomplished by a variety of improvements including reduced piston clearance due to better expansion control, better rings, harder and more accurate cylinder bores and structural improvements in pistons.

Investigation shows, according to the Bohn organization, that piston ring replacements have moved up from around the 20,000-mile mark to 35,000 or higher.

Some interesting data are available from cars used by automobile factory executives where the cars are under the watchful eyes of the service and engineering departments. These are the "guinea pig" cars of the industry. The executives use them in their daily round of travel just like any ordinary citizen. Being available to the engineering and service departments of the factories the cars can be carefully observed as typical of those out in the hands of the public. A check on these cars shows a very distinct gain in satisfactory piston ring mileage.

HERBRAND

MAGIC ROLLWAY WORKSHOP

*Keeps every tool
within easy reach*
**WILL HELP YOU
EARN MORE MONEY**

It means a lot to have the right tool for every job—and you "can't miss" when you have the Deluxe Model MC-103 (shown at right) as your "helper." Consists of 101 essential tools in steel chest and portable workbench. Can be locked when not in use. Easy to roll to any part of shop. Saves wasted steps . . . saves time . . . saves effort—and helps put more money in the pay envelope.

Mechanic's price is only \$102.27 complete, and can be bought on easy time payments.



← New "Van-Chrome"
MASTER TAPPET WRENCHES
Have Bar Design for Rigid Strength

Thin and narrow pear-shaped heads, 15° angle openings, 9 1/2" length and bar design are a few of many features of wrenches in Set No. T-80 (above at left) . . . Ask for details on complete line.

**MAIL COUPON for 186 PAGE
TOOL MANUAL..IT'S FREE**



THE HERBRAND CORPORATION - Fremont, Ohio

Send Tool Manual FREE . . . Also mail data on Rollway Workshop—and Tappet Wrenches

Name

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Perfect Timing

(Continued from page 11)

developed and how much fuel will be saved.

Such data is developed at the Ethyl clinics and the material can be used to sell customers on the use of higher octane fuels. These clinics are now operating in Detroit, New York, Toledo, Little Rock, Richmond, Va., and Oakland, Cal. Other cities will be visited until the entire United States is covered.

Unfortunately, space does not permit giving all the details of the complete clinic but every mechanic should

make a point to visit the clinic when it reaches his neighborhood.

One of the main features of the clinic is the comparison of the power developed by a modern automobile with three different grades of fuel which the Ethyl Corporation calls—"Ethyl," "Regular" and "Third Grade."

Naturally the figures vary with each different car tested. However, a 1937 medium-priced eight using Ethyl gas developed 147 power units at 31 m.p.h. When spark was retarded, the power dropped to 120 and the speed to 24 m.p.h.

With "regular" gas, the maximum power was 120 at a speed of 25 m.p.h.

With "third grade" fuel, the maximum power was 115 at 25 m.p.h. but there was some "knocking."

It is interesting to note that whenever the spark was advanced to the knocking point, the engine temperature increased rapidly and the power decreased rapidly. These conditions are emphasized by some of the data presented with this article.

2500 R.P.M.		
Spark Advance	Brake Horsepower	Exhaust Valve Temp. F.
10 deg.	63.5	1225 deg.
20 deg.	74.5	1190 deg.
30 deg.	80.0	1165 deg.
*35 deg.	80.5	1160 deg.
40 deg.	79.8	1165 deg.
50 deg.	75.0	1180 deg.
3000 R.P.M.		
10 deg.	58.5	1350 deg.
20 deg.	77.0	1280 deg.
30 deg.	84.0	1255 deg.
*40 deg.	86.5	1255 deg.
50 deg.	84.0	1300 deg.

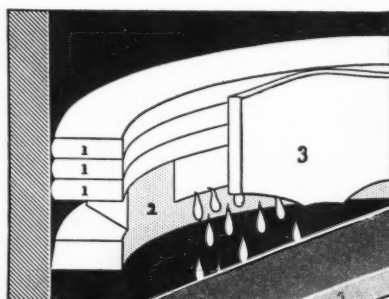
* Point of maximum power.

Smash the Oil Demon

with
Drān-Bac
Oil Ring
Sets!

Lick the notorious oil pumper with a ring Set designed and BUILT for the job . . . Dran-Bac Oil ring Sets!

MORE Wiping Edges.
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GENUINE Swedish Steel Expander.



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3. Expander



.. the
**"Super
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Ring**

All Sections
contact cylinder wall!

Combination Distributor & State Rep. Wanted

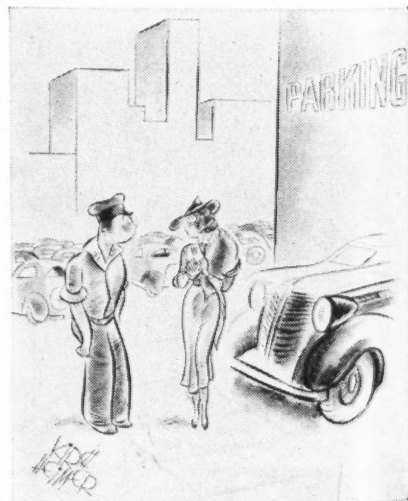
Distributor wanted, centrally located in each state who can meet our requirements for State Representative in addition to being our Distributor in his locality. Compensated separately as our State Representative. Your territory may be open . . . write or wire today.

Drān-Bac . . . the only ventilated sectional oil rings with Expander in which all sections contact cylinder wall right from the start! Available in Sets for 380 car models. ASK for Dran-Bac! Don't be satisfied with less! The Wel-Ever Piston Ring Co., Toledo, Ohio.

Drān-Bac Sets

New Emark Manual

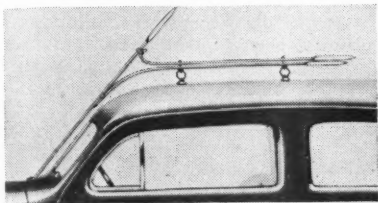
A new battery operating manual has recently been issued by the Emark Battery Division of Thomas A. Edison, Inc., Kearny, N. J. It consists of 48 pages, divided into five 8-page sections and one 4-page section. It covers manufacturing standards, specifications of passenger car, commercial, bus and truck batteries, information on setting up a battery department, and information on the care and servicing of batteries. There is also a section devoted to merchandising plans developed by the Edison Company.



"I've lost my ticket, but my car has a loose spring in the front seat!"

Philco's New Aerial

The Philco Radio & Television Co., Tioga & C Sts., Philadelphia, Pa., has introduced a new "Hi-Way" roof aerial consisting of two highly polished dustproof flexible metal bars, terminating in ornamental spears. New ring-type bakelite supports elevate the bars to the correct distance above the car roof, to which they are attached by means of two suction cups. This aerial lists for \$4.00.



Designed in conjunction with the new Philco auto radios and engineered as an integral part of the radio set circuit, the complete line consists of cowl aerials in one, two and three sections for 1938, and also new types of roof and under-car aerials.

Bonney Catalog Released

Bonney Forge & Tool Works, Allentown, Pa., has just issued a catalog illustrating and describing the complete line for 1938.

Known as Catalog No. 38, it contains 60 pages and is attractively printed in two colors throughout.

Copies of the catalog are available by addressing the manufacturer.

Merrily We Roll Along

(Continued from page 13)

shield, and will have the compression and intake valve assembly (U, Fig. 4) on the end of it. Tap the valve assembly lightly with a hammer, and it will come out of the cylinder, as it is held in by a tight press fit.

This valve is the compression valve, and if it is desired to stiffen the compression action of the shock absorber it is necessary to change either the spring (G, Fig. 2) or the washer (E, Fig. 2), or both, depending on how severe a correction is desired. Increasing the thickness of the washer (E) or the strength of the spring (G) will increase the resistance of the shock absorber. To disassemble this valve, remove the retainer wire (J, Fig. 2) and place the valve on the bench in its normal position. Press down on the washer (H, Fig. 2) and give it a slight turn so that it will come off over the head of the valve stem. Be sure that the valve is re-assembled in its proper order, as shown in Fig. 2.

If it is desired to increase the rebound resistance, place the upper eye in a vise and remove the retaining nut (P, Fig. 3). It will then be possible to lift off the remaining parts of the rebound valve shown in Fig. 3, but before removing the piston (X) be sure to scratch a mark on the inside of it to indicate its position with respect to a punch mark in the end of the piston rod. Replace the spring

(N), the orifice plate (V) or the spring disk (Q) to give lighter or greater resistance for the type of control desired. Reassemble the piston and rebound valve assembly, being sure that the piston is installed on the piston rod in the exact position in which it was originally removed from the rod. This is to insure that the piston and rod are concentric. The order of assembly of the other parts is shown in Fig. 3.

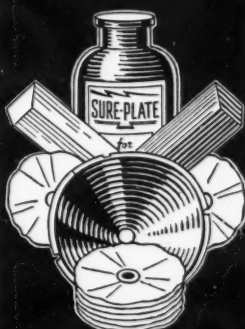
The rod guide assembly (F, Fig. 4) is serviced as a unit including the rod guide bushing and oil seal. If there is any indication of a leak past the piston rod seal it will be necessary to replace the rod guide bushing and seal

assembly. In every case when the rod guide retaining nut has been removed it is important that new gaskets be installed. These are indicated by (R, Fig. 4), and consist of a rubber and a cork gasket. The cork gasket is installed first, and then the rubber gasket is coated with soft soap and placed against the cork gasket.

When assembling the shock absorber, the most difficult part is getting the rod guide retaining nut started square in the threads in the lower cylinder. The threads are quite fine, and if the nut is cross-threaded when it is installed, a leak is sure to result at this point and the piston rod will bind in the rod guide bushing.

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A New Low Cost Method of
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This handy Sure-Plate Kit, complete in every detail, puts mechanics, super-service stations and dealers in the profitable, fast-growing resilvering business.

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Large canvas sign supplied free with each Kit—a vivid display which commands car owner attention.

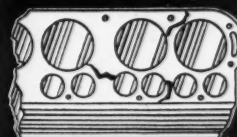
Invest One Dollar— Take Out Eight!

You invest in a Sure-Plate Kit costing \$12.50. With it you can do \$100 worth of headlight reflector or resilvering jobs to earn \$3.50 per hour. For every dollar you put in, you take out eight. Send for a kit today, then start your own campaign to make dim, tarnished headlights bright and your customers' cars safe again. Use coupon below.

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Reading Seen As Probable Race Opener

The 1938 automobile racing season in the United States will get under way in April at the Reading, Pa., fair grounds, according to an early-season survey of the schedule possibilities.

If Reading again gets the curtain-raiser assignment, and every indication points in that direction at headquarters of the Contest Board of the American Automobile Association, it will be the third straight season the Pennsylvania hotbed of speed competition has held the honor. Last year Ralph Hankinson offered the opening program on April 25, and in 1936 he

sent the drivers away for their season's "warmup" on April 26.

The inaugural honor went to Hankinson's Langhorne Speedway, near Philadelphia, Pa., in 1934, after Reading had the date in 1933 and 1932.

If the pre-season dope holds up, Reading will offer the usual sprint type of racing.

Coming in April, the Reading program has cracked the lid off the speed campaign a full month ahead of the nation's outstanding motor classic, the 500-Mile International Sweepstakes, run at Indianapolis each May 30.

How many of the sprint events on the half-mile dirt tracks will be run this year could not be predicted by the AAA at this early date, Ted Allen, Contest Board secretary said. It was anticipated, however, that at least a half-hundred events would run under the sanction of the governing body, including many of the nation's outstanding county, state and district Fairs. The Fair season will get under way in August.

The National Championship schedule, opening at Indianapolis on Decoration Day, presents possibilities of three events this year. Following the Indianapolis classic, Roosevelt Raceway was tentatively carded with the George Vanderbilt Cup classic on July 4, and the 100-Mile title event at the New York State Fair in Syracuse was to wind up the Championship card in September.

The annual Labor Day climb up historic Pike's Peak at Colorado Springs, Colo., with many of the nation's top-flight speedsters promising their entry. The climb, cancelled in 1935, was resumed as an annual classic in 1936.

I'LL SAY THAT LINING CAN TAKE IT!



Toughest tests of motor-car manufacturers can't burn out Johns-Manville Brake Lining

AUTOMOTIVE engineers do not believe in taking chances when they buy brake lining. Witness this performance test of one leading car manufacturer:

Coast down a steep 4-mile grade in neutral, holding the car to 30 m.p.h. by constant braking. At the bottom accelerate to 70 m.p.h., making three emergency stops in as rapid succession as possible from this speed.

A test far more severe than any that would ever be encountered in actual driving! Ordinary brake linings are stripped from the brake shoes by the extreme heat. Some even fail to stop the car once at 70 m.p.h. But time and again, J-M Brake Lining

has made all three stops successfully — has proved beyond question its ability to take this terrific punishment.

Performance like this has given Johns-Manville Linings an enviable reputation throughout the automotive industry. J-M offers you first-quality linings of all types and a fair selling policy that gives you every opportunity for profit. For more information about this money-making combination, write Johns-Manville, 22 East 40th Street, New York City.

JOHNS-MANVILLE

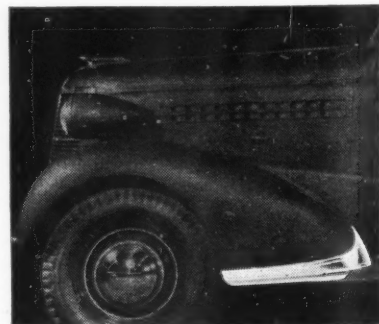


**The Oldest Name
in Brake Lining**

Protects Fenders

Geuder, Paeschke & Frey Co., 1401 West St. Paul Ave., Milwaukee, Wis., has introduced a new product known as "Streamline Armor," designed to protect and beautify front and rear fenders of Ford, Chevrolet, Plymouth and Dodge cars. It is made of heavy steel, with a chrome finish. Illustration is of Streamline Armor installed on the front fender of a Chevrolet.

This accessory marks the entrance of the well-known firm of Geuder,



Paeschke & Frey Co. into the active merchandising of their own trademarked accessories. They have for years been supplying sheet metal stampings to automobile manufacturers, and are credited with having developed the pressed steel engine oil pan of the modern automobile.

"King" Distributor Tester

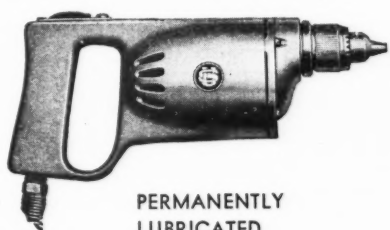
The Electric Heat Control Co., 9123 Inman Ave., Cleveland, Ohio, has announced a new distributor tester. Known as the "King" D-1 distributor drive, the device uses a standard coil and 6-volt battery. It operates on the stroboscopic principle, and is designed for synchronizing and adjusting breaker points, checking spark retard and advance, governor action, cam dwell, and will also show defective breaker points, worn bushings and bearings.

III The Right Keys to Better Business Are III

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For forty years The U. S. Electrical Tool Company has been opening new doors for thousands of mechanics in the better motor shops everywhere, with the best in mechanical equipment. The U. S. Electrical Tool Company today continues to open new doors to better business with the finest array of maintenance keys that human skill and ingenuity can produce.

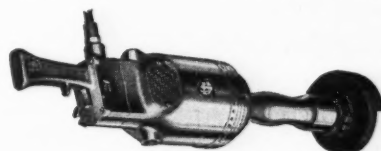
U. S. 1/4" Automatic Drill



PERMANENTLY
LUBRICATED

A sturdy, amply-powered drill for general purpose drilling for intermittent service. Universal motor operates on D.C. or A.C. current of 60 cycles or less. Equipped with ball bearings, 15 ft. three wire rubber cable, 3-jaw geared chuck threaded to spindle.

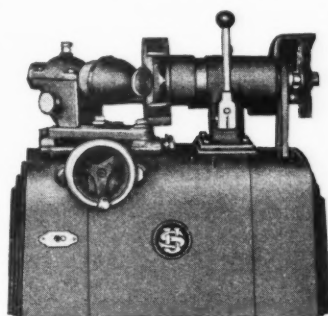
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2 1/2" 4" 5" 6" 8"

"Air conditioned" to prevent dust and dirt from entering motor. Dust-proof switch. Universal motor operating on D.C. or A.C. current of 60 cycles or less. Complete with wheel, wheel guard, 15 ft. rubber covered cable, 2-piece armored attachment plug.

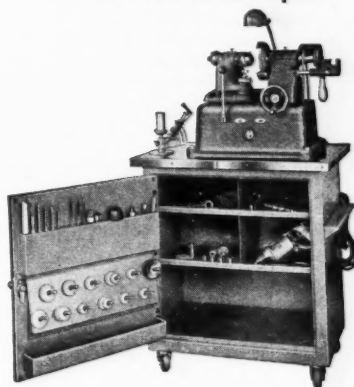
U. S. Refacer—Type V-R 6



New streamline design. Heavy vibration-proof base. Equipped with 1/4 H.P. motor operating on D.C. or A.C. current, 25 to 60 cycle, single phase. Six-point contact chuck. Ball bearing wheel spindle. Complete with 4" grinding wheel and 4" wire brush.



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Includes refacer (as selected), cabinet, wiring, lamp, driver, valve seat stone dresser, valve seat grinding stones, valve seat pilots, ball bearing valve seat grinding machines, valve guide cleaning brushes, carbon cleaning brushes, valve guide cleaner, flexible driving member.



Send today for our free catalog explaining these and a host of other fine U. S. Electrical Tools designed for maintenance shops.

IIIIII THE UNITED STATES ELECTRICAL TOOL CO. IIIIIII

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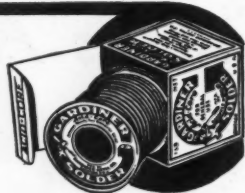
CINCINNATI, OHIO, U. S. A.

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MOTOR AGE, March, 1938

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BALANCED (S-SIDE) PULL
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ONE SIZE FOR MANY
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HOSE CLAMPS
THE HOSE CLAMP WITH THE THUMB SCREW

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They insure your driving safety.
Save their cost thru avoiding accidents.

Write for Literature on New
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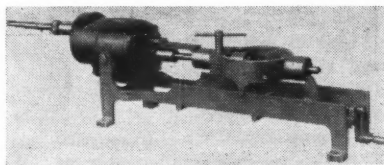
BUELL MANUFACTURING COMPANY
2983 Cottage Grove Chicago, Ill.



Lightweight engine developed for aircraft by Al Menasco, designer. It weighs only 156 pounds.

Fits Piston Pins

The Arrow Head Steel Products Co., Minneapolis, Minn., has announced a new pin hole boring machine for properly fitting piston pins in pistons and connecting rods. A small electric motor drives the cutter, while the piston or connecting rod is held in a jig



sliding on a screw thread in the bed of the machine. This machine insures perfect alignment, is easy to operate, and does a quick job. Price \$225 net. For complete information, write the manufacturer.

Davis Now Hupp Director

Tom Bradley, president, Hupp Motor Car Corporation, has announced the election of S. L. Davis, president of the Hupmobile Illinois Company, Chicago, to the board of directors. Davis, who has been a Hupp dealer and distributor in the Chicago area for more than 15 years, was elected at the regular monthly directors' meeting at which the resignation of Mr. Arthur S. Dewing was accepted. Davis will fill the unexpired term of Mr. Dewing who has left for a lengthy sojourn in the Far East.

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use a—

MASTER
Striper
SET

These lines represent available stripe widths

"EYE APPEAL MEANS BUY APPEAL"
An Approved Tool—for every Modern Paint Shop—Easy to use—Does better work—faster. Exclusive Features. Prices: sets \$1.50, \$2.50, \$4.50, \$5.50, \$8.50. Ask your Paint Jobber or write for literature.

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GENUINE
THE PIONEER MOTOR WELD
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REPAIRS CRACKED CYLINDERS, VALVE SEATS & WATER JACKETS PERMANENTLY.
MADE IN LIQUID AND POWDER FORM.

ALSO MFGS. OF IRON CEMENT, RAD. SEAL, RUST REMOVER, RAD. CLEANER, CARBON AND RUST SOLVENT

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BEZ-L-BALL — NOW AVAILABLE**

Write for Samples and Quotations

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Instantly attachable, Spin-Ur-Wheel comes in six popular colors with novelty crystal insert; fluted, oval and pear-shaped styles; with chrome or enamel base. Bez-L-Ball is available in matching colors and designs.

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Radiator, Battery Repairing and all sorts of soldering jobs easily done with

TORIT

ACETYLENE TORCH No. 23

Simply connect to Presto tank. Price, including a set of 4 tips, \$6.75. Order from your jobber.

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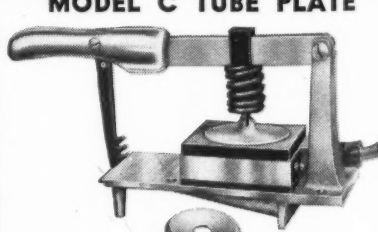
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**THE DEVILBISS COMPANY
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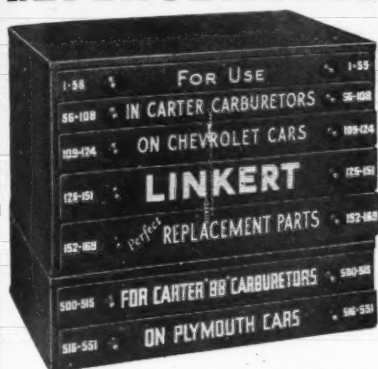
Distributors or direct sales and service representatives available everywhere.

MODEL C TUBE PLATE



Practical for all tube repairs, and especially adapted for attaching rubber valve stems to tubes. The only one of its kind the Patent Office has allowed patents on, patent No. 2009549 and 2086866. Costs to operate less than 1/2¢ per hour. Fully guaranteed. Chase Mfg. Co., 3216 Delmar Blvd., St. Louis, Mo.

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For running-in new and rebuilt engines use auxiliary lubricants containing "dag"* Brand colloidal graphite.

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**I. G. & M. A. Launches
Gold Star Plan**

"The selection and identification of service garages for car owners in strange cities is not a new idea," says the International Garage & Maintenance Assn., "but such selection and identification on a national scale has never been done before by garage men themselves."

The Gold Star Plan of I. G. & M. A., just being launched, is a strictly co-operative activity to create deserved confidence in its Gold Star members' garages.

Selection is now being made by I. G. & M. A., and, according to advice from Headquarters office, their Directory of Gold Star Garages will be in circulation by April 1st.

Each Gold Star member will be provided with a metal emblem sign for identification display, a supply of Directory folders giving the city, address and phone number of every Gold Star garage in the United States and Canada—and Gold Star Service courtesy cards introducing customers to Gold Star garages in other cities.

This Gold Star Plan is only one of several activities set up in the 1938 Business Platform and Program of I. G. & M. A., which is the only national association of independent service operators. Its present officership is well known to the service trade. Its organization set-up is such that each state selects its own Zone and State Councilmen. Zone Chairmen are vice-presidents and members of the Executive Council which governs the affairs of the organization. Earl T. Sadler is Executive Secretary and headquarters office is at 160 E. Illinois St., Chicago, Ill.

**Straightens Box Girder
Frames**

A new clamp designed especially for straightening Chevrolet box girder frames has been developed by the Bee-Line Co., Davenport, Iowa. The clamp grips the frame with a positive clamping action that cannot damage the frame, according to the manufacturer, and makes possible an accurate straightening of bends or twists in the frame. The clamp can be used in connection with any Bee-Line chassis aligner.



"After this we bring it to a garage for repairs!"



**Starrett Blades
For Auto Shops**

The complete line of Starrett Hacksaw Blades includes all the types and sizes you need for any metal cutting job. You can have your choice of Tungsten Alloy, High Speed Steel or Molybdenum in all standard machine or hand frame sizes. See them at your regular tool dealer's or write for Starrett Automotive Tools Booklet G which lists the complete line and shows many tools for making repair and overhaul jobs more profitable.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
Dial Indicators for Every Requirement

ATHOL, MASS., U. S. A.



**Use
Starrett
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**10
Minutes**

... in your own shop
to TURN and UNDER-
CUT a COMMUTATOR
with the new

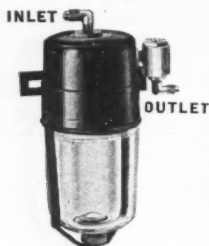
SMART TOOL

FIRST and ONLY LOW-PRICED Unit for
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Ask Your Jobber.

SMART TOOLS, INC. Dept. A
FALL RIVER, MASSACHUSETTS

KEEPS WATER OUT OF THE CRANKCASE

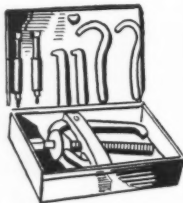


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Oildex prevents ex-
cessive — costly —
crankcase dilution
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UNIVERSAL PULLER SET



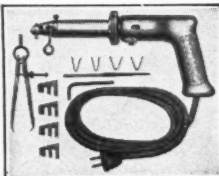
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joints, steering
wheels, timing
gears and many
other pulling jobs.
Packed in sub-
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National Machine & Tool Co.,
Jackson, Michigan

CHAMPION TIRE GROOVER

Means
**BIGGER
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Cuts accurately, quick-
ly, easily. Adjustable
for both depth and
width of cut. Adjust-
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heating element. Uses
either A-C or D-C.
Air cooled, pistol grip handle—one hand control. Cuts
long grooves all around tire in less than one minute.
Ideal for use with special new Champion Stand.



Write for **FREE FOLDER**

Full information on both items
O. E. THOMPSON & SONS
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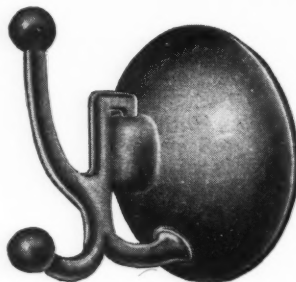
Tire Prices Up Again

Leading mail-order houses which
cut tire prices up to 14 per cent in
their mid-winter flier catalogs, issued
a month ago, have raised prices back
to levels prevailing in their regular
fall-winter catalogs. The new and
higher prices are shown in the 1938
spring-summer catalogs which became
effective March 1. The price increases
vary on different sizes but are suffi-
cient to restore price levels of last
fall which were several per cent
higher than mail-order prices of a
year ago.

The new prices affect only tires
sold via mail order and do not apply
to retail store prices of the mail-order
houses. These prices were not reduced
when the mid-winter flier catalogs
were issued. Mail-order first line re-
tail store tires average between 90
and 92½ per cent of the average
going price on first line tires of the
industry.

It's a "Stick-Up"

The new "Stick Up" coat and hat
hook recently announced by Mayer
Mfg. Corp., 1436-42 West Randolph
Street, Chicago, Ill., is intended for
home, office or automobile use. Easily
attached to any surface by means of



the rubber suction cup. A special in-
troductory offer is now being made in
which three dozen hooks will be sup-
plied for the cost of two dozen, and in
addition an attractive metal display
stand will be supplied free. Retail
price, 10c. each.

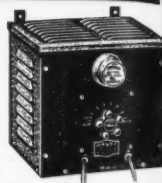
Manley Products Now Remco Products

The name of the Manley Products
Corp., State and Hay Sts., York, Pa.,
has been changed to The Remco Pro-
ducts Corp., same address. There has
been no change in the management,
nor corporate structure, the presi-
dent, Mr. Robert E. Manley, reports.
This change was made to secure uni-
formity in the name of the company
and the products. The Remco Pro-
ducts Corp. manufacturers—Remco
Valves, Remco Motor Drives and
Remco Garage Equipment.

Handy BATTERY CHARGERS

LOWER OPERATING COST!
MEANS MORE-PROFIT FOR
YOU. No. 6-B Wall type.
6 Battery size.
Price, without bulb \$24

WRITE for Bulletins on com-
plete line of "HANDY"
chargers, testers and racks.
BALDOR ELECTRIC CO.
(Electrical Mfrs. for 17 years)
4375 Duncan Ave., St. Louis, Mo.
GUARANTEED for 2 YEARS



SIMPLEX PISTON RINGS

A BETTER
RING FOR
LESS MONEY

46¢
LIST

Ask your
dealer why?
SIMPLEX PRODUCTS CORP.
3820 Kelley Ave. Cleveland, Ohio

Arrow Signals Legally Approved



Demand, insist upon and get this
extra Arrow Quality—it costs no more!

**ARROW SAFETY
DEVICE COMPANY, INC.**
MEDFORD, NEW JERSEY

CLASSIFIED ADVERTISING

INVENTORS—Protect your rights. Before dis-
closing your invention to anyone send for free
blank form "Evidence of Conception" and in-
structions. Personal attention given all cases.
Lancaster, Allwine & Rommel, 415 Bowen
Building, Washington, D. C.

Motor Temperature Gauges repaired \$1.50.
Missing parts replaced. Originators of this
service. Factory Methods. Radiator Shutter
Thermostats repaired \$2.50. United Speedometer
Repair Co., Inc., 436 W. 57th St., New York
City.

All makes of Fuel Pumps repaired, guaranteed,
\$1.25, defective parts replaced. "Capco" Renew
Service, 1801 14th Street, Elkhart, Indiana.

FOR THE OIL GASOLINE & WATER CONNECTIONS VELLUMOID

Every yard of VELLUMOID and every VELLUM-
OID gasket is backed by 25 years of manu-
facturing experience. You can absolutely rely
on this Quality Product.

THE VELLUMOID CO., WORCESTER, MASS.

Will a fast cutting disc STAND UP?



YES... IF IT'S MADE BY

Carborundum

REG. U. S. PAT. OFF.

Here's a sanding disc that's built to cut fast and stand up. Uniformly graded grains of Aloxite Brand Aluminum Oxide are coated on an unusually durable, flexible fibre backing. That's why Carborundum-made discs cut faster and last longer. Try them on your sanding machine. You'll find they make a smooth foundation for a perfect finish. Ask your jobber for Aloxite Brand Aluminum Oxide Combination Fibre Back Sanding Discs—"K-5" for paint removal—Regular for metal finishing.

THE CARBORUNDUM COMPANY

REG. U. S. PAT. OFF.
NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of The Carborundum Company)

CARBORUNDUM
REG. U. S. PAT. OFF.
ABRASIVE PRODUCTS



Grey-Rock Contest Chance To Win \$1,000

In discussing the prize contest of the U. S. Asbestos Division of Raybestos-Manhattan, Inc., previously announced in MOTOR AGE, Mr. Franklin A. Miller, Grey-Rock's replacement sales manager, said: "We have made this contest just as easy and simple as possible. There are no more rules than are absolutely necessary. We could think of no better way to spend \$5,000 than to give it to those fellows who have done so much in the past few years to help Grey-Rock become 'the fastest-growing line'—the boys in the shops who actually work with the brakes. I hope everyone who knows anything about brakes will enter this contest and take a crack at winning the prize money. The \$5,000 is there—and somebody's got to win it!"

The contest which is announced in Grey-Rock advertisements this month closes at midnight, June 15, 1938.

AEA Elects Officers

E. V. Oehler, vice-president and general sales manager of Briggs & Stratton Corp., Milwaukee, was elected president of the Automotive Electric Association at that organization's annual business meeting and distributors' conference.

George J. Beattie, president of Auto Electric Service Co., Ltd., Toronto, was named vice-president of the distribution division; Frank B. Willis, vice-president and director of sales for Bendix Products Corp., was named vice-president of the manufacturers' division, and George S. Cole, secretary and general manager of Leece-Neville Co., Cleveland, became secretary-treasurer. Ralph Sandt is the AEA general manager.

Philco Laboratory to Detroit

Philco Radio and Television Corp. has moved its automobile radio engineering laboratories from Philadelphia to Detroit, the shift taking place Jan. 1.

The move was made, according to company officials, to place the Philco research engineering staff in close propinquity to the motor vehicle plants in and about Detroit, for whom Philco manufactures automobile radios.

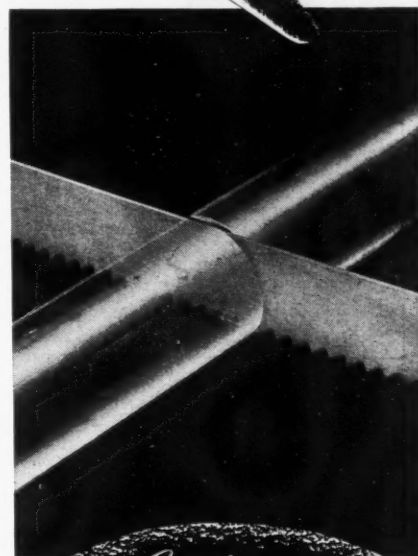


"You see it, too?—For a minute I thought it was something I ate!"

Atkins Blue
End Hacksaw
Blades are
preferred by



United Air
Lines.



Continuous
PERFORMANCE

WHEN EVERY SECOND COUNTS

In the plane zooming along the skyways, or in cutting the metal of that plane before it has left the shop, split-second schedules are equally important. Many a factory is toolled up and keyed up to get every second's production out of the machines in a day.

On such schedules Atkins Blue End Hacksaw Blades can make the difference between profit and loss on a single machine operation. It is the length of time they will run longer than others—the number of cuts they will make in excess of others—It is their continuous performance that saves time otherwise lost in changing blades. At the end of the job fewer blades have been used, less time spent stopping and starting, and more work has been turned out.

No wonder this quality of continuous performance wins the choice for Atkins wherever they are tried. Get into the habit of saying "Atkins Blue Ends."

E. C. ATKINS AND COMPANY

423 S. Illinois Street, Indianapolis, Ind.

ATKINS
Silver Steel
SAWS
CERTIFIED SAWS, SAW TOOLS,
MACHINE KNIVES, ETC.



AUTO-RADIO AERIALS

Efficient as they are
beautiful



20 SMART NEW MODELS

Toppers • Hinge Whips • Side Cows • Bumper

QUALITY antennae, built to furnish better pickup, less static and all-round fine reception. Highest grade materials and workmanship guaranteed.

THE RANGER As shown above; telescopic; streamlined; perfect insulation; smart ship design; ALL BRASS, triple chromium plate, non-rusting.

SIDE COWL As shown at right; 5 distinctive telescopic or non-telescopic types, triple-chromium rust-proofed; 60 to 96 inch extension.

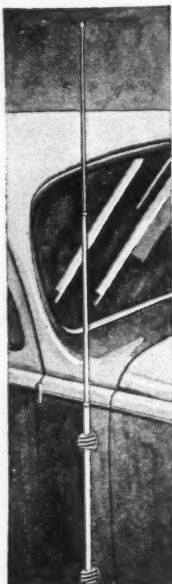
Complete illustrated catalogue of antennae and auto radio accessories will be sent upon request.

Attractive Jobber Discounts

INSULINE CORP. of AMERICA

25 Park Place

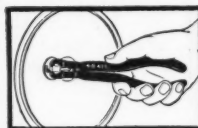
New York, N. Y.



Don't cut your fingers!

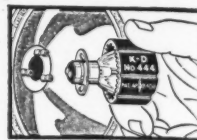
use one of the

K-D Lamp Bulb Tools



←No. 425

No. 444→



When installing or removing Lamp Bulbs. Sure, Safe, Fast, Inexpensive.

Your Jobber has them in stock

K-D MFG. CO.

Lancaster

• Pennsylvania



Maintenance Men

who read

MOTOR AGE

Account for

85% plus

of all the business

done in this

Important Field



What Protects the
South, East, and West Sides
of a Car Going North?

—It's a Do-Ray Nu-Ray
Tail Light



The new cars employ the same side lighting principle as Nu-Ray tail lights because it means added safety.

You sell this extra protection and added safety when you handle the Do-Ray Nu-Ray line. Attractive Do-Ray displays will help you and the profits will make it worth while. Ask your jobber or write for catalog.



Do-Ray Lamp Company
1458 S. Michigan Ave. Chicago, Ill.

DO-RAY

ORIGINATORS
OF ALL-GLASS
SAFETY LAMPS